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R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington, D. C.

VOLUME XXVII NUMBER 2

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GOOD YIELDS START FROM GOOD SEED.

Better Crops with Plant Food

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A square deal and . .

Peace—with Pork Chops

Jeff McDermid

WHEN YOU say farewell to a male relative who is outward bound to parts unknown, bent upon becoming a bombardier for instance, it is hard to pierce the gloom and uncertainty ahead of us far enough to believe that his success as a purveyor of death and dismay will bring us all a better world.

When a hard-working farmer is bereft of his last trusted helper and must make 1943 food goals with less resources in man power than usual, it is hard for him to make this grim business add up into anything like reconstruction and stability.

The case is chaotic indeed for the young man obliged to give up a lucrative and thrilling new job after graduation, and be told that henceforth his waking hours must be spent in constant preparation for destruction or defense against aggression.

It is confusing indeed for great universities and technical schools to become drill grounds and armed camps. It is perplexing for farmers to shift their criticism from a food surplus and retrenchment to a different economy, one of scarcity and terrific expansion. It is trying at best for all artists and craftsmen to submerge their peaceful pursuits to enter the hateful realm of munitions making and mobilization.

Yet if there was not something inside us that encouraged us to feel hopeful of a more secure and harmonious future for humanity of all races and creeds when this holocaust is quenched, I feel sure the temper of the times would be less vibrant and purposeful.

Anything that an unlettered person of no profound scholarship can voice or vision will not count much, it is true.

Yet we all have our dreams and our convictions about what may be hoped for finally; and anyone from the vice-president on down to yours truly has a democratic privilege to speak his mind and have his little guess.

OUT of a murky world of stark realism somebody must use idealism to inch us onward toward the peaceful pay-off after all this intense strife. Realism must be faced first, and in so doing we get a sort of beginning in our scroll of hope.

When the armistice comes, the first big job will be one for farmers, exporters, and shippers. Whether we shall have the productive power and the shipping space to provide anything equal to the tremendous demand is not for me to guess.

Few farmers actually realize what is in store for our soils and our returning land army. The first craving that must be satisfied is the prime animal urge for food. Starvation and short rations will play a big part in the mental and spiritual attitudes of the conquered and enslaved nations everywhere, in the Orient as well as in Europe. Unless America, from Canada to Patagonia, can muster up all its best food and fiber reserves for transmission to points of awful scarcity inside of a year or so after the truce comes, we will be faced with all the terrors of mob violence, to say nothing of the sullen, brooding resentment which makes reconstruction difficult at any time.

Without sufficient food of the right kind it will be labor lost indeed to attempt social or political management on any scale. However, in its wake will come the golden opportunity for the agricultural leaders of this country and the lands of Central and South America. By this I mean that we shall look to trained agronomists, skilled soil specialists, able farm managers, high-class market experts with ability to handle vast volumes on a quality basis, and behind them all we shall depend upon the laboratory advance men and uncanny scientific scouts.

To begin with, depreciation of the soil in central Europe through devastation and neglect will vary from 25 to 50 per cent. Lack of artificial fertilizer and the scrapping of the plants that made it, loss of livestock manure and green-manuring crop residues, the complete demoralization of the original owners, and the loss of proper machinery and equipment will throw the food resources of Europe backward 200 years. Their herds and flocks of pedigree standards and superlative production have been wasted and destroyed. (A famous draft stallion was found abused and neglected hauling a garbage truck in Paris.) This alone will mean a swing back for our breeders from the era when they imported their bulls and rams and stallions to one in which they will be hard put to supply enough breeding stock to give the depleted farms of Europe a meager start again.

Along with this more immediate and emergency salvage in store for our utmost agricultural brains and brawn, will come the vast and complex problems of restoring proper land titles to rightful owners, getting them the roads and machinery and supplies with which to combat poor soil and injurious insects, plant diseases, and bad weather conditions.

Right now at home we are slowly evolving a sounder way to man the farms with teen-age youth subject to draft, and giving adequate recognition to the older classifications too, so as to maintain our domestic food-producing power above par. But if this is going to be the only objective, we have lost sight of the imaginary picture just drawn.

IT will not be enough just to man our farms at home. We must be constantly training persons capable of doing those more skillful tasks in the higher realms of agriculture, fitting them to be advance men, technical discoverers, and leaders of direction. We must have hosts of engineers for farm implement instruction abroad, hundreds of laboratory scientists bent upon im-

provements in soils and nutrition, and hosts of fellows with experience like Hoover's in assembling and speeding the food onward—to say nothing of the recruits we shall need besides those of the Red Cross, to see that the fruits of our home acres get into empty bellies abroad, on a fair and impartial basis.

And this brings me bang up against another echo of the theme of my last discourse—that the dreadful demands of war have perhaps gained for us a setting and a background that is ripe

for just what the occasion demands when peace arrives.

We have had famines and food dilemmas before this, but they have been distant affairs of little direct concern to our boys and only something to subscribe to with a casual nod, and then forget. But this time we have, or will have later on, a host of returning soldiers who have been on the spot and know what it's all about, who have seen hunger, naked and woebegone, and who will be challenged in their hearts to set things right.

Looking at it this way, maybe it's a good thing that some of us gave up our gasoline so that others might travel. Travel, as we always said at every milestone en route in old vacation days, is the best education available. Hosts of our absent lads never got very far from home, or at least they never found conditions so alarming and chaotic as they have on their present gallant quest. America was pretty well standardized you know, and hunger was almost an unknown thing, except in spots. So these fellows will get a real insight into the actual physical demands of the masses abroad, and probably want to have a hand in reconstruction instead of destruction, for a change. To accomplish this, some of them must be trained anew.

Looking back into the Middle Ages for further light on this old phenomenon of travel as an educator and an eye-opener, we can quote briefly from an authority on the incidents of the Renaissance. He says:

"The real symbolic instrument of the rising age was not the printing press or the chemical retort or the cannon, but the compass. Discovered long before, it was only now that it began to be trusted. The essence of the new attitude was an irresistible impulse into distance, an insatiable urge to unveil, to pierce and to explore everything. The discoveries in themselves were not the essential; what was decisive was the tendency to discover, the noble quest for its own sake. Traveling, which had been hitherto regarded as a necessary evil, became the supreme pleasure. Everywhere there was a restless, wandering movement of students, artisans, soldiers, scholars, preachers, and merchants—entirely on the move. The men of that age experienced life by faring through it, and it was inevitable that this colossal energy of mobility should have its consequences."

Then followed the great penetrations overseas to newly discovered realms by such mighty men of imagination and daring as Henry the Navigator, Bartolomeo Diaz, Christopher Columbus, Pedro Cabral, Fernando Magellan, John Cabot, and Hernando Cortez. Moreover, they found great American cultures on this continent which were beyond the scope of anything existing in their mother land. Temples, arsenals, gardens, obelisks, fountains, tapestry, paintings, finely tooled silver and gold work, textiles of the rarest beauty, fragrant and delicious foods produced by a farming and gardening class of skill—these astonishing things framed the

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Maintaining Fertility When Growing Peanuts

By E. R. Collins

In Charge of Agronomy Extension, North Carolina Extension Service, Raleigh, N. C.

IT is generally recognized, in the commercial areas, that peanuts are a soil-depleting crop. This is frequently expressed by the farmer with the statement that "they are hard on the land." Even in the light of this recognized fact, the American Fertilizer Practices for 1939 show that only 35.2% of the peanuts were fertilized in North Carolina, 37.3% in Georgia, 52.3% in Virginia, and 11.2% in Florida. For comparison, 94, 98, 99.5, and 98.9%, respectively, of the cotton acreage were fertilized in these states.

Where peanuts are fertilized, the confusion that exists can be illustrated by the use of the 1939 survey of American Fertilizer Practices. In Virginia, North Carolina, and Georgia, for which fertilizer practices are given, the number in the group reporting the use of miscellaneous fertilizer is greater than the number reporting the use of any single fertilizer analysis. Fertilizer recommendations for the different states show similar variations.

Peanuts are grown for widely different purposes. Southeastern Virginia and northeastern North Carolina primarily produce large peanuts for the edible trade. Southwestern Georgia and southeastern Alabama produce the small type peanuts for oil. Florida utilizes the crop primarily for hog feeding and the production of hay. Other states in the Southeastern area, and the other areas of these states, grow peanuts for one or more of the given purposes or for soil improvement. Soil types used for the production of peanuts range from sandy Coastal Plain soils to clay Piedmont soils. The use of widely different types and varieties, depending upon the utilization of the crops, together with variation in soils and climate, naturally leads to different requirements in the respective areas.

The characteristics of the plant and the method of harvesting the crop make the results from field trials subject to considerable variation. Fig. 1 illustrates graphically the continuous fruiting of the peanut plant with "pegs" or gynophore growing down from the branches to the soil and the production of the peanuts below the surface of the soil. Fig. 2 shows a bunch of peanuts with large, well-matured and small, undeveloped nuts on the same vine.

Early harvest results in obtaining many immature nuts, which shrivel on drying. These light nuts are blown out with the vines when the nuts are

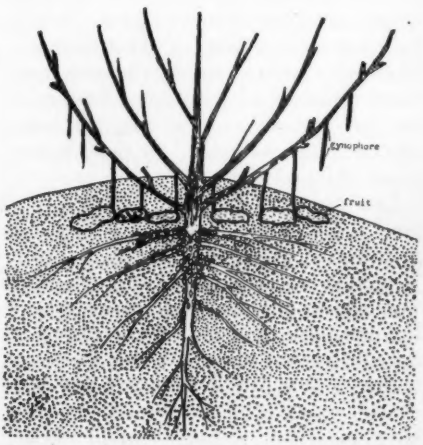

Fig. 1. Diagrammatic illustration showing the continuous fruiting of the peanut plant and differentiation between the root and fruit zones. (Courtesy of Dr. Leland Burkhart)

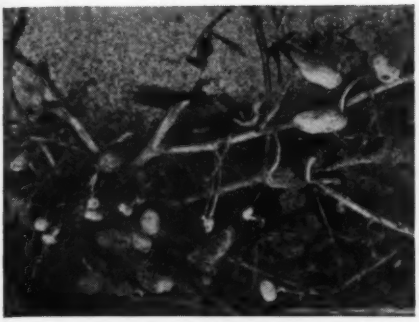

Fig. 2. Illustrating large, well-matured and small, undeveloped nuts on the same vine.

picked with a picker. Late harvest causes the loss of the first formed, large, mature nuts due to the breakdown of the stem which attaches the nut to the vine. Plumpness and the percentage of well-filled kernels determine the value of the nuts on the edible market and influence the oil content. Well-filled kernels do not show much difference in oil content between varieties. The higher oil content of Spanish peanuts is largely due to the relatively larger percentage of well-filled nuts in the Spanish variety in comparison to the Virginia type varieties.

Large increases in yield cannot be generally expected from fertilizer treatments, as only the nuts produced in a relatively short period of the continuous blooming of the plant can be saved at harvest. Peanuts are very sensitive to fertilizer salts, and decreased germination frequently accompanies applications of commercial fertilizers, when not properly placed in bands to the side of the seed. Fig. 3 shows decreased germination from potash-lime mixed with the row under the seed in comparison to application on top of the row two weeks after planting. Fertilization

Fig. 3. Rows 1 and 3 received 300 lbs. 12% potash-lime on top of the row 2 weeks after planting.
Rows 2 and 4 received 300 lbs. 12% potash-lime mixed with the soil in the furrow before planting.

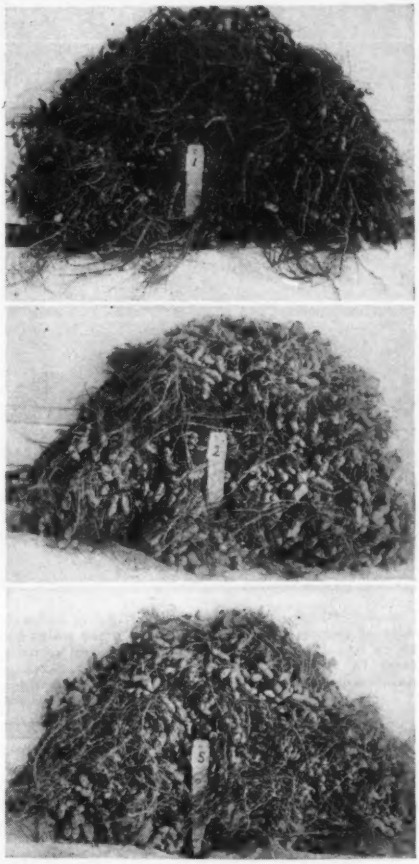

Fig. 4. Development of peanuts with and without calcium in a soil relatively high in potash. Top—No treatment; Center—300 lbs. of gypsum (landplaster) on the foliage at blooming; Bottom—400 lbs. ground dolomitic limestone mixed with the soil in the row before planting.

treatments high in calcium result in premature shedding of the leaves, which reduces the life of the plant. Improper balance between nutrients results in the production of poorly filled nuts or "pops." Therefore, improper fertilization may result in decreased yield.

Fig. 5. Digging peanuts. (A) Digging holes for poles with post-hole digger; (B) Cutting off tap root of peanuts and loosening soil after poles have been set in hole and leaned over to permit mules to go by; (C) Tamping dirt well around poles to prevent stacks falling over; (D) Nailing on cross arms to keep peanuts off ground; (E) Stacking peanuts with nuts next to pole. In this case a pointed steel cap is on top of the hole to slip vines over pole to tie the stack together; (F) Completed stack.

The calcium fertilization of the pegging zone or the soil around the developing peanuts is important, as well as the fertilization in the root zone, according to recent results from the North Carolina Experiment Station. See Fig. 1 for relative areas of the root zone and the zone where the nuts develop.

The importance of fertilizing the zone in which the nuts are developing, as well as the root zone, cannot be over-emphasized as this may explain many of the variable results obtained. The presence of root hairs on the developing pods had been reported previously, although it had not been demonstrated that these root hairs absorbed nutrients from the soil. The uptake of nutrients by the growing fruit has been demonstrated by introducing lithium sulphate into the zone of the developing pods, which was isolated from the root zone, and later lithium was found in all parts of the peanut plant. Adjacent plants which receive no lithium in the fruiting medium contain no lithium in the plants.

Recent results from the North Carolina Experiment Station show that normal, well-filled kernels do not develop where there is a high potassium level in the area of the developing nuts. Moderate potassium levels can be present in both the pegging and rooting

Fig. 6. Hauling peanut stacks to picker. (A and B) Wagon and sled used for hauling peanuts to picker; (C) Pushing pole under stack to loosen stack and to put on wagon; (D) Two men lifting stack with pole to place on wagon; (E) Tipping stack on wagon. Stack has just rolled off pole onto wagon; (F) Tipping stack off wagon at picker and removing pole as stack falls to the ground.

areas where they are accompanied by high calcium levels. Fig. 4 shows the effect of added calcium on the yield of Virginia Bunch peanuts on a soil low in calcium in relation to potash. Potash applications with the calcium treatments decreased the yield over those obtained by calcium alone. These results were obtained using the Virginia type peanuts, and no inference is made that the results will apply to the other types of peanuts produced.

The necessity of having only a moderate potassium level in the soil around the developing fruit is very far-reaching when it is recognized that the peanut plant takes up large amounts of potash. A crop of Virginia type peanuts producing two tons of hay and one ton of unshelled nuts will remove the equivalent of approximately 200 lbs. of 50% muriate of potash. This high potash removal is one reason for the soil-depleting properties of the crop and explains why potash deficiency is so common on cotton and soybeans and corn in the peanut-growing area where little fertilizer is applied to peanuts. Fig. 10 shows the loss of leaves on cotton due to potash deficiency, when the cotton was grown in rotation with peanuts receiving no fertilizer.

The method of harvesting which is common in North Carolina and Virginia is shown in Figs. 5, 6, and 7. The vines, nuts, and a portion of the

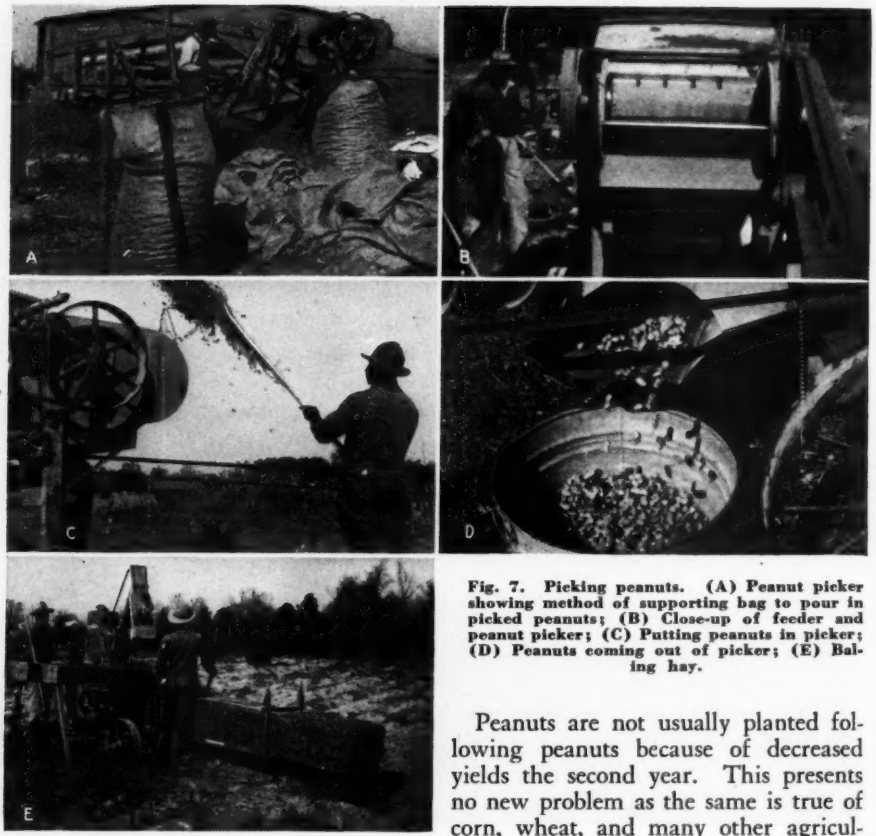

Fig. 7. Picking peanuts. (A) Peanut picker showing method of supporting bag to pour in picked peanuts; (B) Close-up of feeder and peanut picker; (C) Putting peanuts in picker; (D) Peanuts coming out of picker; (E) Baling hay.

roots are removed leaving the field void of vegetation and organic matter as shown in Fig. 8. After drying, the entire stack is hauled to the picker (Fig. 6) and the vines baled for hay after the nuts are removed by the picker (Fig. 7).

Hogs are frequently turned into the fields to glean any remaining nuts or traces of vegetation. It has been similarly recognized that alfalfa, lespedeza, soybeans, and other legume crops are soil-depleting when harvested for hay, even though the roots and stubble remain on the land. Fig. 9 shows lodging from severe potash deficiency on corn in a corn-soybean rotation, where the soybeans were cut for hay. Applications of potash to the corn and the soybeans partially corrected the soil-depleting properties of the soybeans.

Peanuts are not usually planted following peanuts because of decreased yields the second year. This presents no new problem as the same is true of corn, wheat, and many other agricultural crops. Peanuts would naturally be more soil-depleting than some of these crops because they are seldom fertilized, and all vegetation is removed from the field.

On first thought, the solution to the soil-depleting properties of peanuts would be the rotation with other crops and fertilization to take care of plant removal. Lime (CaO) and potash (K_2O) account for approximately 75 per cent of the mineral nutrients removed by the peanut crop. Therefore, at least these two major nutrients should be applied to the crop in order to maintain soil fertility.

Direct applications of potash to peanuts above 50 to 75 lbs. of muriate of potash have shown a general trend to decrease yields and increase the percentage of poorly filled nuts or "pops."

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Feeding Materials By Way of the Soil

By Firman E. Bear

New Jersey Agricultural Experiment Station, New Brunswick, N. J.

ONE of the highly important tasks assigned to plants in the economy of Nature is that of collecting mineral elements from the soil and preparing them for the use of animals. Since plants have always constituted the primary food of animals, it has generally been assumed that, by and large, they supply everything, minerals included, which animals require.

In their natural state, animals are free to roam over large areas of land, and any deficiency of mineral elements that conceivably might exist in the plants growing in any one location should be compensated for by the more highly mineralized vegetation in another. Domesticated animals are known to have considerable capacity to balance their own rations when the opportunity is provided. It frequently happens, however, that when they are confined to a given ranch or farm, and their food consists only of the products of that area, specific abnormalities in growth and reproduction result.

It would appear, therefore, that certain soils and plants, or soil-plant associations, either do not supply all the mineral elements animals require or they do not provide them in suitable ratios or in adequate amounts. On the other hand, ill health of animals frequently arises not from any inadequacy of the several necessary mineral elements but from the presence in the soil or water of elements that are toxic, the most frequently mentioned mineral toxins being selenium and fluorine.

It is apparent from these considerations that there is need for diversity in the diet of animals. For man, the several food materials normally come from such widely separated areas and the soils in these areas differ so markedly in their mineral composition that little difficulty need be experienced in balancing the mineral supplies in the diet, if a reasonable degree of intelligent selection of foods is exercised. It is an interesting fact, however, that those groups of country folks whose diets are largely restricted to food products of local origin may suffer more from mineral deficiencies than do city folks of similar standards whose food supplies have their origin in such widely separated areas as Maine, Florida, Kansas, and California.

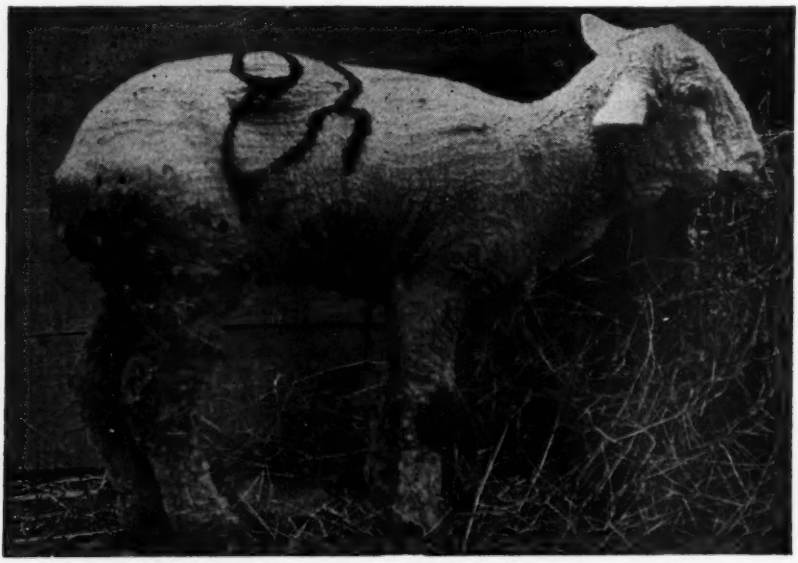
Why Soils Vary

As would be expected, there is great variation in the mineral content of the many soil types of the United States of America. The differences in soils are due, in part, to the marked modifications in mineral makeup of the rocks from which the soils were formed. But, in most cases, climate is the dominating factor in determining the composition of the soil. Thus, the irrigated alkaline soils of the West, on drying, frequently show incrustations of the sulfates, chlorides, and carbonates of sodium, potassium, calcium, and magnesium. In contrast, the acid soils of the humid areas of the eastern and southern parts of the United States consist almost entirely of insoluble rock residues from which the water-soluble

* Journal Series paper of the New Jersey Agricultural Experiment Station, Rutgers University, Department of Soil Chemistry and Microbiology.

salts have long since been leached out and lost to the sea. In practice, the primary task of the man who farms in an arid area is to supply water to his soil, whereas that of the farmer in a humid area is to recover the lost soil salts from the beds of ancient seas, now occupying positions above the ocean level, and to haul them back to the land.

Fortunately for the United States, the wide expanse of highly productive soil constituting the great central grain and



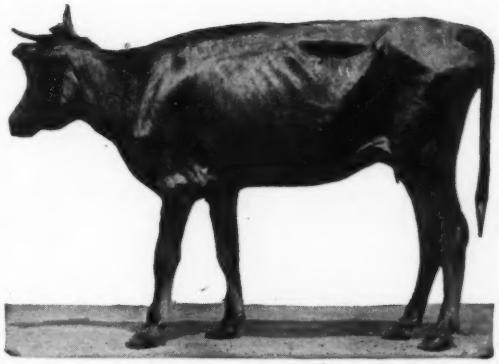
Forage from limed land helps grow healthy livestock, but this lamb had to eat forage from unlimed land. (Courtesy W. A. Albrecht, University of Missouri.)

livestock belt receives enough rainfall for crop needs, yet not such an excess as would result in serious losses of mineral elements by leaching. Although there are normally no salt deposits on the surface of the soil of the prairies and plains, large supplies of some of the more important of these essential salts are stored lower in the soil profile, often within the ready reach of deep-rooted crop plants. The problem of maintaining the supply of mineral elements in the soils of these semi-humid areas is much less difficult of solution than it is in the heavier rainfall areas to the East and South.

Mineral deficiencies in plants, and in the diet of the animals that feed on these plants, are most likely to occur in marginal areas of the humid regions where the lay of the land, the physical properties of the soil, or the system of farming does not permit of the economic use of adequate amounts of lime and fertilizer, once the virgin fertility of the soil has become exhausted. Such farming areas are widely distributed throughout the older agricultural sections of the United States. The original soil organic matter in these areas contained considerable stores of mineral elements which had been collected over the centuries by the forest trees that had grown up and fallen back on the land. But when the land was cleared and put under the plow, its reserves of mineral nutrients were soon exhausted by the leaching and eroding action of the unimpeded rainwater, and through crop removal.

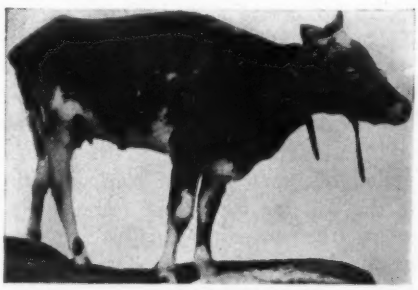
Here and there over the United States and its possessions, one finds soils that are highly exceptional in their chemical composition. Depending upon the nature of their peculiarities, these soils have become noted for the poor or

excellent nutritional quality of their produce, as the case may be. There are large areas of sand containing as much as 98% silica, the percentages of the essential nutrients being limited to very small figures. Some of the cultivated peats are made up mostly of severely leached organic matter which is very low in its content of mineral elements, particularly potassium. The lateritic soils of our tropical outposts often consist, in large part, of the oxides of iron and aluminum, the effect of which is to reduce the content of available phosphorus to a very low level. Certain Hawaiian soils contain as much as 70% manganese, and the plants growing on them become chlorotic unless sprayed with a solution of ferrous sulfate. Soils of the more humid areas of the United States are generally acid, often throughout the entire depth of their profiles, and contain relatively small amounts of available calcium and magnesium.



In advanced cases of phosphorus deficiency an animal develops a poor appetite for roughage, becomes emaciated, and may show this sweenied condition. (From Fla. Sta. Bul. No. 264)

In contrast with these negative-propertied soils, there are many others that are famed for their very high content of the more important mineral elements. Thus the soils of the irrigated arid areas are normally alkaline in reaction and very high in their content of basic cations. The soils of the great central plain and prairie areas, although slightly acid on the surface, are underlain with deposits of lime and gypsum at levels that are often within the reach of plant roots. The area around Lexington, Kentucky, widely known for its bluegrass and fine horses, is covered with soil the analysis of which shows as much as 1% phosphorus, in contrast to the all-too-common soils containing around 0.05% of this element. The lower depths of many of the limestone-valley soils in humid areas contain considerable amounts of carbonate of lime, which accounts, in large part, for the continued high productivity and the great popularity of these soils among farmers.



Showing the emaciated condition associated with cobalt deficiency.

The operator of a farm situated on a soil containing high percentages of the essential mineral elements has, in effect, a gold mine the quality of whose output is reflected not only in high acre yields but in the fine finish of the livestock as well. Such soils also put their stamp on the farmer's family, causing the children to grow up to more sturdy man- and womanhood than is the lot of those whose formative years are spent on land that is deficient in its supply of the highly essential mineral elements. It is difficult, of course, to know how much of the known physical differences in the people who live in good and poor soil areas is due to the soil itself and how much of it must be credited to the discrepancies in the financial well-being of the two groups. With the prosperity associated with good land

Courtesy F. S. A. Scene from Wadesboro, N. C. Photo by Post.
Human health goes with the soil and its fertility.

comes the financial capacity to care for human ailments. Certainly the farmer who has to buy a large part of his soil minerals in the fertilizer bag is at an economic disadvantage with the one whose soil already contains the fertilizer elements in abundance.

Yet, it is well to keep in mind that there is no necessary similarity in the composition of the soil and its plant produce. The mineral content of plants varies with the species, the variety or strain within that species, the climate of the area, the weather during the particular season of the plant's growth, and the stage of maturity of the crop at the time of harvest (3). Furthermore, if any one of the essential mineral elements is deficient in a soil, certain others that may be present in abundance tend to accumulate, often in relatively very high percentages, in the plants that grow on that soil. In some recent experiments involving the growing of alfalfa plants on prepared soils, the exchange complexes of which had been made to contain varying ratios of calcium to potassium, it was found possible to raise the calcium content of the dry matter in these plants from 0.77 to 1.82% and, meanwhile, to lower their potassium content from 3.30 to 1.15%, without materially affecting the yield. Similarly, although constant amounts of available magnesium and phosphorus were supplied in all cases, the magnesium content of the hay varied between 0.23 and 0.34% and that of phosphorus between 0.30 and 0.36%.

In proportion as the supply of any given element in the soil increases or decreases, however, the content of this element in the vegetation growing on that soil likewise tends to increase or decrease. This helps to explain the plant successions that occur in nature, the accumulation of minerals in the residues of one plant association making it possible for the succeeding higher association to gain a foothold. In agriculture, this process normally works in the opposite direction. Thus, if hay and pasture crops are removed for a period of years without compensation to the soil for its loss of mineral elements, the clovers gradually give way to the less nutritious but still highly useful timothy and bent-grass types, and these in turn to the almost worthless

Andropogon (broomsedge) and Danthonia (poverty grass) types.

It is common practice among farmers to sow mixtures of legumes and grasses. They know that in proportion as the supplies of lime and mineral elements are present in adequate amounts in the soil, either over the whole field or in localized areas, the legumes will thrive, but if there are areas of deficiency, the grasses rather than weeds will predominate. One of these standard sowing mixtures consists of alfalfa, red clover, alsike clover, and timothy seed. If such a seed mixture is sown, certain areas of the field may have an almost perfect stand of alfalfa whereas other areas will be covered equally well with one or another of the remaining three plants. As the field is reseeded to such mixtures over the years in the crop-rotation program, it frequently happens that although seed of all four plants may have been sown, only those of the timothy survive. An examination of the mineral composition of these four plants (table 1) provides an explanation of the farmer's experience.

Table 1.—Percentage Mineral Elements and Nitrogen in Four Hay Plants

Plant	Calcium	Potassium	Phosphorus	Nitrogen
Alfalfa	1.43	2.02	0.21	2.02
Red clover	1.21	1.58	0.18	1.58
Alsike clover	0.76	1.44	0.23	1.44
Timothy	0.27	1.36	0.16	1.36

The percentages recorded in table 1 represent averages of many determinations (6). The individual plants from the analysis of which these averages were derived may have varied greatly in their mineral composition, for as long as land is in a high state of fertility a plant growing on it enjoys luxury consumption of the elements that are present in greatest abundance, removing more of them from the soil than it requires. As the fertility level is reduced, however, the percentage content of the essential mineral elements in the plant falls to lower and lower levels until, in due time, it approaches a point below which any further decrease in the supply results in limiting the yield to the quantity of that element that is present in least abundance. At that stage, species of lower mineral requirements gain the ascendancy. Since relatively larger amounts of the elements that are present in greatest abundance are removed from the soil, the supplies of all the mineral elements tend gradually to fall to a minimum in both soil and plant. Thus, one can more nearly determine the actual mineral requirements of a plant by growing it on a depleted soil than on a highly fertile one. In other words, when the fertility level is high, the analysis of the plant is really an analysis of the soil on which it grew, and only when the supply of all the mineral elements is relatively low does it become an actual index of the needs of the plant.

If a higher level of mineral nutrition of animals is desired, this can be accomplished either by the use of feeds from areas where the soil is known to have a high content of the essential elements, or by a liberal use of lime and fertilizer on the soil on which the feed for these animals is to be grown. This does not argue, however, that the easiest or best means of supplying the supplemental amounts of the mineral elements that may be required by livestock in humid areas is by way of the soil. It is evident that the simplest procedure is to add salts of these elements to the feed in the animal's manger or trough, or to put the minerals on the human being's dinner plate.

It seems worth-while at this point to compare the chemical composition of

plants and animals. Naturally, the composition of either is highly variable and, unfortunately, the number of complete analyses is very limited. Recognizing these limitations, table 2 presents the actual analysis of one 6-stalk sample of one plant, maize (5), and one calculated analysis of one animal, man (7).

TABLE 2.—PERCENTAGE COMPOSITION OF MAIZE AND MAN*

Element	Maize	Man	Element	Maize	Man
Oxygen	44.57	65.	Magnesium	0.18	0.05
Carbon	43.70	18.	Sulfur	0.17	0.25
Hydrogen	6.26	10.	Chlorine	0.14	0.15
Nitrogen	1.46	3.	Aluminum	0.11	.....
Silicon	1.17	.....	Iron	0.08	0.004
Potassium	0.92	0.35	Manganese	0.03	0.0003
Calcium	0.20	1.5	Sodium	0.10**	0.15
Phosphorus	0.18	1.0	Iodine	.....	0.00004

* Although not listed in the table, copper and zinc are known to be of value to both plants and animals.
** Estimated from other analyses.

An examination of the data in table 2, which is admittedly incomplete, reveals that the chemical composition of maize and man is much the same as to the number and identity of the elements, but markedly different as to their percentages. But both plants and animals have certain special mineral requirements. Insofar as is known, the elements cobalt and iodine, both of which are known to be required by animals, are of no importance in plant economy, nor are the molybdenum and boron that are needed by plants of any known use to animals.

Assuming that the whole maize plant was to be used for food, the weakest spot in the mineral supply, if only those elements that are listed in table 2 are considered, would appear to be its lack of adequate percentages of calcium, phosphorus, sulfur, sodium, and chlorine. Experience has shown that all of these elements, with the possible exception of sulfur, are likely to be lacking in foods and feeds.

It is well known that such extra quantities of these and other mineral elements as are required by animals, over and above those furnished by the plants they consume, can be added to the feed to good effect in the form of mineral salts. Thus it has long been the custom to supply common salt and bonemeal as mineral supplements to animal feeds, and iodized salt is widely used in the preparation of human food. In addition, it has been found to be good practice to add salts of cobalt, manganese, iron, and iodine to the mineral mixtures that are offered to livestock in certain land areas (4). The question naturally arises as to whether any advantage would accrue from supplying these elements to the animal by way of the soil and plant instead.

Recently the biological method of evaluating soil fertility has again come into prominence (1). This method consists in feeding several lots of animals the produce from plots of very poor land that have been variously treated with lime and phosphate, and measuring the live-weight increase in relation to the amount of feed consumed. As would be expected, not only the yield but the feeding value per unit weight of produce is increased by the use of lime and phosphate on these very poor soils. This means that the farmer has the practical possibility of obtaining a two-fold profit from the use of these minerals on such soils.

But such possibilities are largely confined to sub-marginal land or to conditions of extensive farming such as occur on range land or stony pastures. They

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Long, straight rows of small fruits and vegetables in the Egers farm garden near Tell City. No bugs, no weeds. Besides feeding a family of 11 and the hired hand, this garden showed a profit of more than $100 in cash sales.

Victory Gardeners Produce & Preserve

By W. B. Ward

Department of Horticulture, Purdue University, Lafayette, Ind.

"LIVE at home and enjoy it," a slogan of the vegetable growers of Indiana, applies to the home gardener. Supplying the family with adequate amounts of fresh fruits and vegetables from home-grown produce is the goal. Every farm a garden, and a garden only where a garden will grow! To keep the wheels of progress in motion means a job for everyone. The home gardeners who do their part are very important cogs in this wheel to aid in making Victory a reality in a shorter time. Diets are improved, the cost of feeding the family is reduced, and there is considerable satisfaction in knowing that every gardener is conserving the country's available food supply.

The home gardener who plans and plants to use the available space to the best advantage is not only helping to feed the family but also contributing much to the national income. The food is grown at home. There is a supply of fresh fruits and vegetables for daily use, and the winter's supply is preserved in season with the quality protected.

Today's problems are not so much the meat and potato diet, although these are important foods, as it is the wider use of green, leafy, yellow, and other vegetables. These vegetables with

many new uses, may contain from a trace to a good supply of essential vitamins, and from a few to many calories. They may be grown under a wide range of soils and climatic conditions. Recently, an eminent dentist expressed his opinion that the "Rampant Decay of Teeth" was no doubt due to the greater use of refined sugars, and not enough of the natural sugars found in fresh fruits and vegetables. Rationing, especially of sugar, may be a blessing in disguise, and the silver lining on the clouds may not always be visible even when pointed out.

The garden should not stop with just the first planting, but should be planned to produce the maximum with the minimum effort and expense. The home gardener's compass should be set on a course that will avoid that destroyer of good health, known as poor diet, and go by the direct route to reach the objectives of ample production of quality body-building foods. Knowledge of a food's value to the body and the methods necessary for preservation are just good garden principles.

The first essential to a good garden plan is the type or method of cultivation. When power equipment is to be used, the rows must be far enough apart to accommodate the tools, and sufficient

Above: **The background for better nutrition for many Purdue co-eds resulted in the actual growing and preservation of garden produce.**

Below: **A winter cover is advisable. Commercial fertilizer should be used when manure is not available; 300 lbs. per acre of Victory Garden Special, 3-8-7, broadcast over the rye three weeks before plowing will furnish plant food for the garden.**

Above: **A low-wheel cultivator with shallow sweeps kept this one-half acre garden free from weeds and properly cultivated.**

Below: **A weed patch last year, a victorious Victory Garden now. The manager of one of the largest stores in Evansville, a nutrition specialist, and a county worker take time to visit and congratulate the proud young gardener.**

space allowed for turning at the ends of the rows. When hand-cultivating tools are used, the rows must be such that one or two times through with the cultivator will do the job. Many of the vegetable crops could be spaced in 12- or 24-inch rows. Good garden hand cultivators have supplemental equipment, as sweeps and shovels, that will cultivate as much as 12 inches at a time, doing a good job easily. Onions, lettuce, radishes, and other similar crops, in 12-inch rows, would require once through, while once up and back would do for the 24-inch rows.

Close planting or spacing permits the natural growth of the plant to shade the soil. This shading, along with the shallow and timely cultivation, will aid in the conservation of moisture and organic matter. Exposed soil and that which is cultivated deep permit the heat, particularly on hot days, to penetrate into the soil and sometimes clear to the root system. If it is good weather to kill weeds, one must remember it is just as good a time to stunt or kill plants. The best time to cultivate is in the late afternoon or early evening, with the object in mind of loosening the soil and killing the weeds. Only those crops that one intends to eat should be

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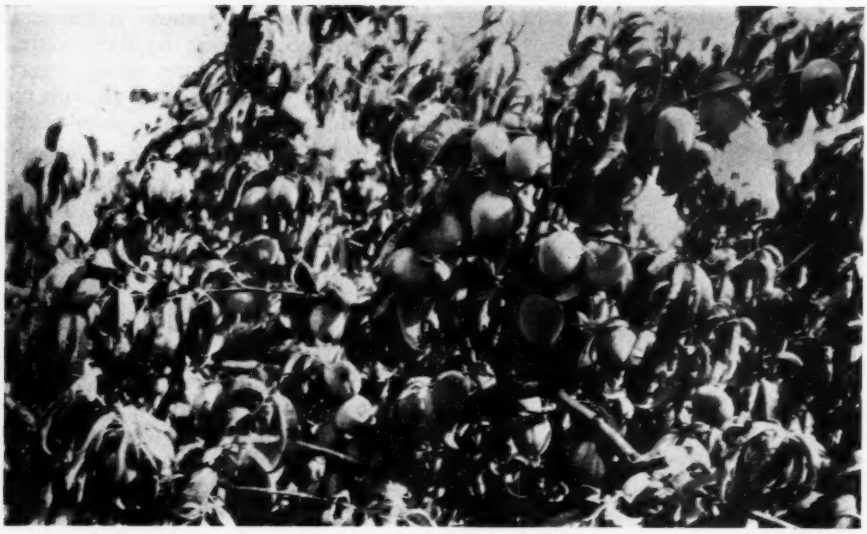


Close-up of a normal peach tree which received complete fertilizer.

Plant Food for Peach Profits

By A. B. Bryan

Clemson Agricultural College, Clemson, South Carolina

INTELLIGENT fertilization, with potash, phosphoric acid, and limestone as well as nitrogen playing important roles, has been a prime factor in developing and firmly establishing a commercial peach industry in South Carolina which has grown from a dozen or so carlots in the early 1920's to a present annual production of 6,000 to 7,000 carlots. This current production is from only 59 per cent of the 5,000,000 trees now in the State's commercial orchards and is likely to increase to around 10,000 carlots when the other 41 per cent of the 5,000,000 trees come into bearing.

The story of South Carolina's peaches, interesting in many of its phases, is a story of successful production, standardization, and marketing practices—these three factors, but the greatest of these is successful production, and that is where intelligent fertilization comes in.

But let's get first a brief outline of history on this Palmetto State peach industry, which in 1942, according to available statistics, put South Carolina in the rank of third most important peach-producing State in the Union, excelled only by California in the West and Georgia in the East.

There are commercial peach plantings in 27 of South Carolina's 46 counties, but only eight counties run above 100,000 trees per county, these in order of number of trees being Spartanburg, York, Greenville, Chesterfield, Cherokee, Saluda, Edgefield, and Laurens. Since 51 per cent of all the trees are in the large Piedmont county of Spartanburg, and since four of the other peach

counties are adjoining or adjacent, Spartanburg is the hub of the South Carolina peach-producing area.

Though there had been a few commercial plantings of peach orchards in South Carolina before that time, the enterprise really began in the early 1920's, when the destructive work of the cotton boll-weevil was making dark days for cotton growers, and the high prices being received by nearby Georgia and North Carolina peach growers were very stimulating.

In 1921 and 1922, several dozen farmers in Spartanburg and elsewhere in the State were encouraged and aided by agricultural extension workers in planting trial peach orchards.

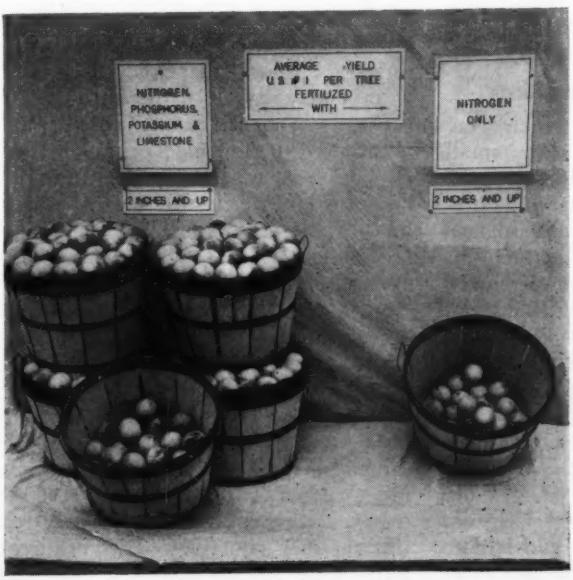
In 1923, 16 carlots of peaches were shipped from these South Carolina orchards, and the annual production rose gradually to around 1,000 carlots in 1935.

Since 1935, the production of Palmetto State peaches has risen sharply to the present production of 6,000 to 7,000 carlots—and thereby hangs our tale of intelligent fertilization as a key factor in production.

Because for many years following the commercial peach plantings of the '20's South Carolina growers fertilized peach trees with nitrogen only, the orchards began to develop potash deficiency, and by 1934 approximately one-half of these orchards showed potash hunger and consequent falling off in production.

In that year, 1934, horticulturists of the South Carolina Agricultural Extension Service began to conduct careful fertilizer demonstrations, to test the value of potash, phosphoric acid, and limestone in addition to nitrogen for profitable peach production. At once yields of marketable peaches per tree and per acre began to improve noticeably.

Averages from trials made on 14-year-old trees in Spartanburg county for 1936, 1937, and 1938, are convincing proofs of the efficacy of well-balanced plant food for peaches. These tests showed an average yield per acre (108 trees) of 484.2 bushels of U. S. No. 1's (2 inches and up) from trees receiving the complete fertilizer, against only 29.7 bushels per acre of U. S. No. 1's from trees fertilized with nitrogen only. Yields of smaller peaches from the two plots were not widely different, the nitrogen-only trees averaging 25.38 bushels of U. S. No. 1's, 1¾ to 2 inches, against 24.48 bushels from the completely fertilized trees; and 52.38 bushels of culls from nitrogen only, against 68.04 bushels from completely fertilized trees.



The totals in these tests are striking, 107.46 bushels average per acre from nitrogen-only trees and 576.72 bushels average per acre from trees

completely fertilized. But, of course, the commercially important difference is in the yields of U. S. No. 1 peaches of large size, which command the market.

As further proof of what balanced plant food means to hungry peach trees, here is a statement direct from a report of E. H. Rawl, Clemson College extension horticulturist, who has taken the lead in these demonstrations of the value of potash, phosphoric acid, and limestone along with nitrogen for the successful and profitable production of peaches. Mr. Rawl is speaking of the 1936-8 tests already referred to.

"Portions of Plot 1, which gave average yields (1936 and 1937) of only 29 bushels from nitrogen only, were treated adequately with phosphorus and limestone, in addition to nitrogen. The cover crops of rye responded strikingly, but the trees in the summer of 1937 were in a very weakened and unhealthy condition, and some of them were attacked by shot-hole borers. However, commencing in the fall of 1937, and continuing through the spring of 1939, these trees were properly fertilized with nitrogen, phosphoric acid, and potash. With this treatment the average yield per acre of U. S. No. 1 peaches, two inches and larger, improved from 29 bushels to 146 bushels in 1938, and 356 bushels in 1939."

Potash-Deficiency Symptoms

"The leaves of the trees which were fertilized without potash were small and of an unhealthy color, showed 'scorching' of the margins and tips, and otherwise displayed typical potash deficiency.

"The trees which were fertilized without potash produced very inferior new growth and a very small number of fruit buds, and these buds apparently were not as large and plump as normal buds should be.

"In 1935, the trees which showed potash deficiency symptoms produced a very scant supply of weak buds. Many of the twigs 12 inches long did not contain any fruit buds and seldom did many such twigs contain more than 4 or 5 buds, and most of them were single buds. However, the twigs from the trees which were fertilized with ample potash and which did not show any indication of potash deficiency had a superabundant supply of vigorous buds. It was not uncommon to count as many as 25 buds on twig growth 12 inches in length. The new twig growth on the trees which were deficient in potash was scant and of a relatively small diameter measurement."

Mr. Rawl emphasizes the fact that the results we have been discussing were obtained from an Elberta orchard on Cecil clay loam, which had been fertilized with nitrogen only for a number of years.

Fertilizers to Use

These demonstrations and the practices of many successful growers indicate that, for similar conditions, the amounts of plant nutrients advisable for bearing trees are these: 100 lbs. of potash (K_2O), 50 lbs. of phosphoric acid (P_2O_5), and 16 to 48 lbs. of nitrogen (N) per acre.

The recommended practice, which has given excellent results, is to apply all the phosphoric acid and one-half of the potash, and in some instances a small portion of the nitrogen, in the fall under the cover crop, and the following spring the other half of the potash and all or practically all of the nitrogen.

For these needed plant nutrients, applications can be made of 250 lbs. of 20 per cent superphosphate and 100 lbs. of 50 per cent muriate of potash in the fall; applications in the spring of 100 lbs. of muriate of potash and 400 lbs. of nitrate of soda or its equivalent.

A chemist of the South Carolina Experiment Station, Prof. J. H. Mitchell, throws an interesting sidelight on the flavor of peaches from completely fertilized trees as compared with peaches grown on trees receiving nitrogen only. His analyses of the fresh peaches show that the fruit from the completely fertilized trees contained 21.7 per cent more total sugars and 31.7 per cent

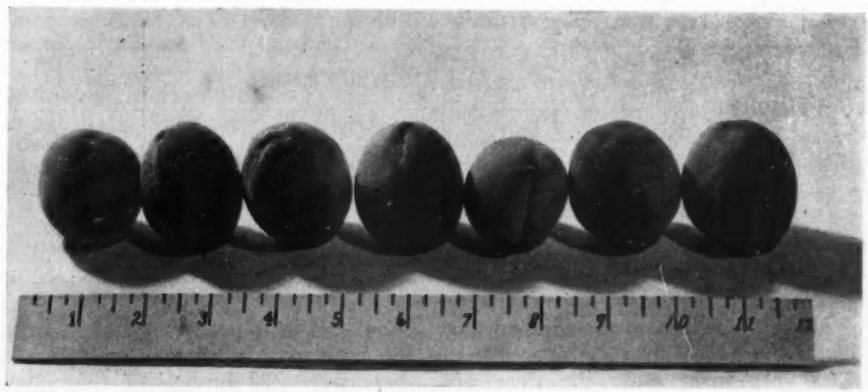
Representative size of peaches from trees that received balanced plant food including potash.

more sucrose than did the fruit from trees fertilized with nitrogen only. The fruit so analyzed came from the same trees used in the fertilizer demonstrations, and it was not tree-ripened fruit but fruit in the "hard ripe" stage, the same as gathered for shipment. Tree-ripened fruit would doubtless have shown a higher percentage of sugars and sucrose.

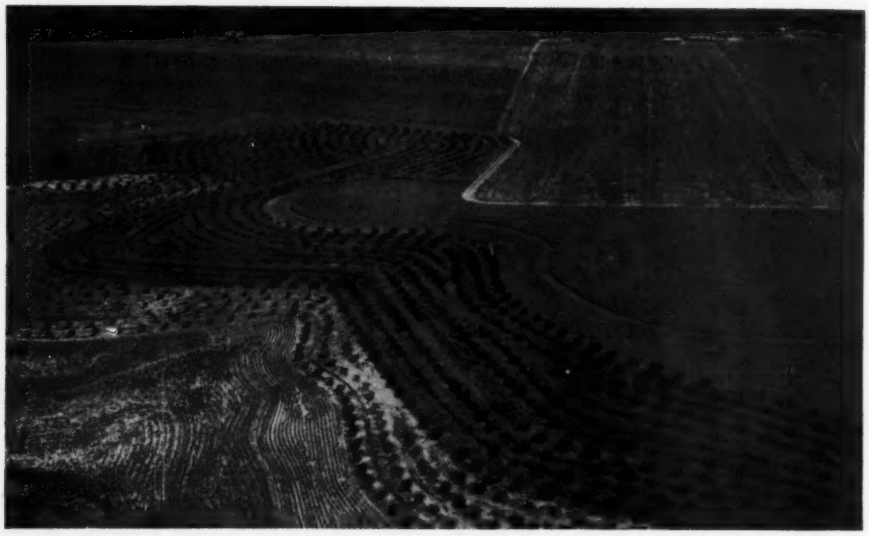
A few words about certain factors other than plant food in the production of peaches seem to be in order, such as contour planting, intercropping, cover crops, thinning, etc.

In the rolling hills of the Carolinas and Georgia Piedmont sections, contour planting of peach trees is a soil conservation measure and naturally affects the long-time yields of peach orchards. In the Piedmont section of South Carolina, where most of the peach orchards are located, the Nichols type of terrace is recommended and used generally. This terrace has a broad shallow channel with a moderate size mound on the lower side. Tree rows are made on or near the terrace ridges, and the rows between the terraces are planted on tree-row ridges to further retain rainfall and reduce erosion of orchard soils.

For cover crops in winter these orchards are planted to rye, oats, vetch, and Austrian winter peas. For summer cover, cowpeas and crotalaria are used. Many new orchards are intercropped for the first three summers with cotton, but where that is not done, the summer green manure crops are used toward soil maintenance. Intercropping with cotton is not advised as best practice.



Representative size of peaches from trees receiving nitrogen only.



This air view shows peach trees planted on the contour to prevent erosion and loss of soil fertility.

A practice which Palmetto State peach growers find most profitable is that of thinning peaches. When large crops are produced, the resulting small fruit seldom sells for prices that pay for harvesting, packages, and transportation. Demonstrations in thinning excessive crops show that this does not mean reduction of total yield in bushels and that the larger fruit commands a profitable price.

In a thinning test in Spartanburg county in 1940 an acre of six-year-old Elberta trees showed the following results.

YIELDS PER ACRE FROM ELBERTA PEACH-THINNING DEMONSTRATIONS

	2 inches & up		1¾ to 2 inches		Total	
	Bushels	Per cent of total	Bushels	Per cent of total	Bushels	Per cent of total
Not thinned.....	198	46.6	227	53.4	425	100
Thinned.....	384	95.8	17	4.2	401	100

Most of the trees in the thinned plot had the fruit thinned to leave 800 to 1,000 per tree; while the trees not thinned averaged approximately 2,000 peaches at maturity. It should be noted that the total yields harvested from the two plots were approximately the same, but that the yield per acre of peaches two inches and up from the thinned plot was 384 bushels, or 95 per cent of the total; whereas, on the trees not thinned, only 198 bushels, or 46 per cent, were of the size two inches and up. In other words, the yields of the size two inches and up from the thinned trees was approximately twice as great as was the yield of the same size from the trees not thinned. Furthermore, there were only 17 bushels of 1¾-inch peaches per acre from the trees which were thinned, while there were 227 bushels of this small size fruit from the trees not thinned.

Building Terraces with Slip Scrapes

By Arvy Carnes

Chief, Division of Engineering, Southeastern Region, Soil Conservation Service

WHILE Charles Nathan Kearley is now serving as a first lieutenant in a barrage balloon battalion at Camp Tyson, Tennessee, the work he did before Pearl Harbor as a Soil Conservation Service technician in Alabama is helping a lot of Southern farmers get from their farms the extra production needed in the war effort.

Back in the days when Kearley's chief interest was keeping productive soil on Alabama farms instead of keeping barrage balloons in the sky, he used to lie awake at night when gully-washing rains came, trying to devise some method by which low-income farmers could construct adequate terraces to control the run-off from such rains with equipment available on their farms.

It was Kearley's interest in small farmers—without tractors and modern terracing equipment—that finally led him to hit upon the idea of using slip scrapes, or dragpans as they are called in some sections, for terrace construction. As a result, more than 40,000 acres of farmland in Alabama and other southeastern states have been terraced with slip scrapes since 1939, and the acreage is increasing each terracing season.

One evening while reading a Department of Agriculture publication about farmers in Arkansas and Texas building terraces with fresno scrapers, the idea occurred to Kearley that slip scrapes could be used in a similar manner. Very few Alabama farmers have fresnos, but many of them have slip scrapes, or can borrow or buy one of these relatively inexpensive implements.

Charles N. Kearley, a first lieutenant in a barrage balloon battalion at Camp Tyson, Tenn., developed the slip-scrape method of building terraces.

At that time, Kearley was with a CCC camp assigned to the Soil Conservation Service at Carrollton, Alabama, and with the help of farmers in the camp area he began experimenting with slip scrapes in building terraces.

It didn't take long to work out a practical method, which impressed officials of the Soil Conservation Service and other agricultural agencies, and soon the results obtained in the Carrollton camp area were being duplicated throughout Alabama and other nearby states.

The method is simple. In heavier soils it is necessary to loosen the ground before beginning work with the slip scrape. A land at least 10 feet wide is plowed by bedding to a backfurrow 3 to 4 feet above the surveyed channel line. The finishing furrows at the outer edges of the land provide guide furrows that are helpful in loading and dumping the slip scrapes. In sandy soils where the soil moves easily, this preparatory plowing may be limited to plowing out two guide furrows.

The loading of the scrape is begun at the upper guide furrow. As it is drawn across the area between the two furrows the pan is filled with earth, which is dumped immediately below the lower finishing furrow to form the terrace ridge. On the return trip, the team and empty scrape is driven across the finished section. This firms the loose earth on the ridge. This work is repeated until the terrace has a satisfactory cross section.

Adequate channel capacity for the terraces can be obtained by this method, but usually the upper slope of the terrace ridge is left rather steep. Therefore, it is advisable to follow the work done with the slip scrape by using the one-land method of plowing. This flattens the upper slope of the ridge and brings the center of the channel in its proper place. The width of this land should be 12 to 14 feet, depending on the slope of the field.

"I was surprised," says F. T. Denny, of Richland County, South Carolina, "how simple it was to build terraces with a dragpan. After less than an hour of instruction, my tenants were able to go ahead and do a good job of building terraces."

Pink Temple, negro farmer of Pickens County, Alabama, built 5½ miles of terraces on 45 acres in his spare time during the winters of 1939 and 1940 with what he calls a pair of "plug" mules.

James F. Brown, of Santuc, South Carolina, says that he and his son terraced 43 acres of cropland during the last two winters. "This work", he explains, "was done with a slip scrape, as the weather would permit and without interfering with other farm work."

Although terraces cannot be built as fast with slip scrapes as they can with tractors and heavier equipment, the slip-crape method is faster than ordinarily supposed. Thomas Massey, of Rockingham County, North Carolina, reports he terraced two acres of his tobacco land at the rate of 100 feet an hour, using a mule, a one-horse plow, and a slip scrape. Curtis Chandler, of Banks County, Georgia, built nearly 800 feet of terraces in eight hours, using two mules, two men, and a slip scrape.

J. W. Leonard, French Camp, Mississippi, built 6,100 feet of slip-scrape terraces during the fall of 1941. "The terraces," he says, "were built at a rate of 900 feet per day, or at a labor cost of 50 cents per 100 feet. From a drainage and row-layout standpoint, my cropland has been greatly improved. Before terracing the land, I was making 900 lbs. of seed cotton an acre, but this year I made 1,300 lbs. an acre."

Cost of Terrace Building

The cost of building terraces with slip scrapes will vary, depending on labor costs, but in most cases Southern farmers have found the method economical, as it affords them an opportunity to put their labor to good use when regular farm work is not so pressing. Moreover, if tenants are hired to do the work, it means more money for them. If a farmer operates a small farm and has no tenant help, he can do the work himself after the fall harvest season.

One farmer may build his terraces with slip scrapes at the low rate of 30 cents per 100 feet, while another may find it costs him 60 cents per 100 feet. On an average of 465 feet of terraces per acre, the labor cost will then vary from $1.40 to $2.80 an acre.

Terraces and contour tillage are widely accepted in the Southeast as companion conservation practices. All of the 40,000 acres of farmland in the

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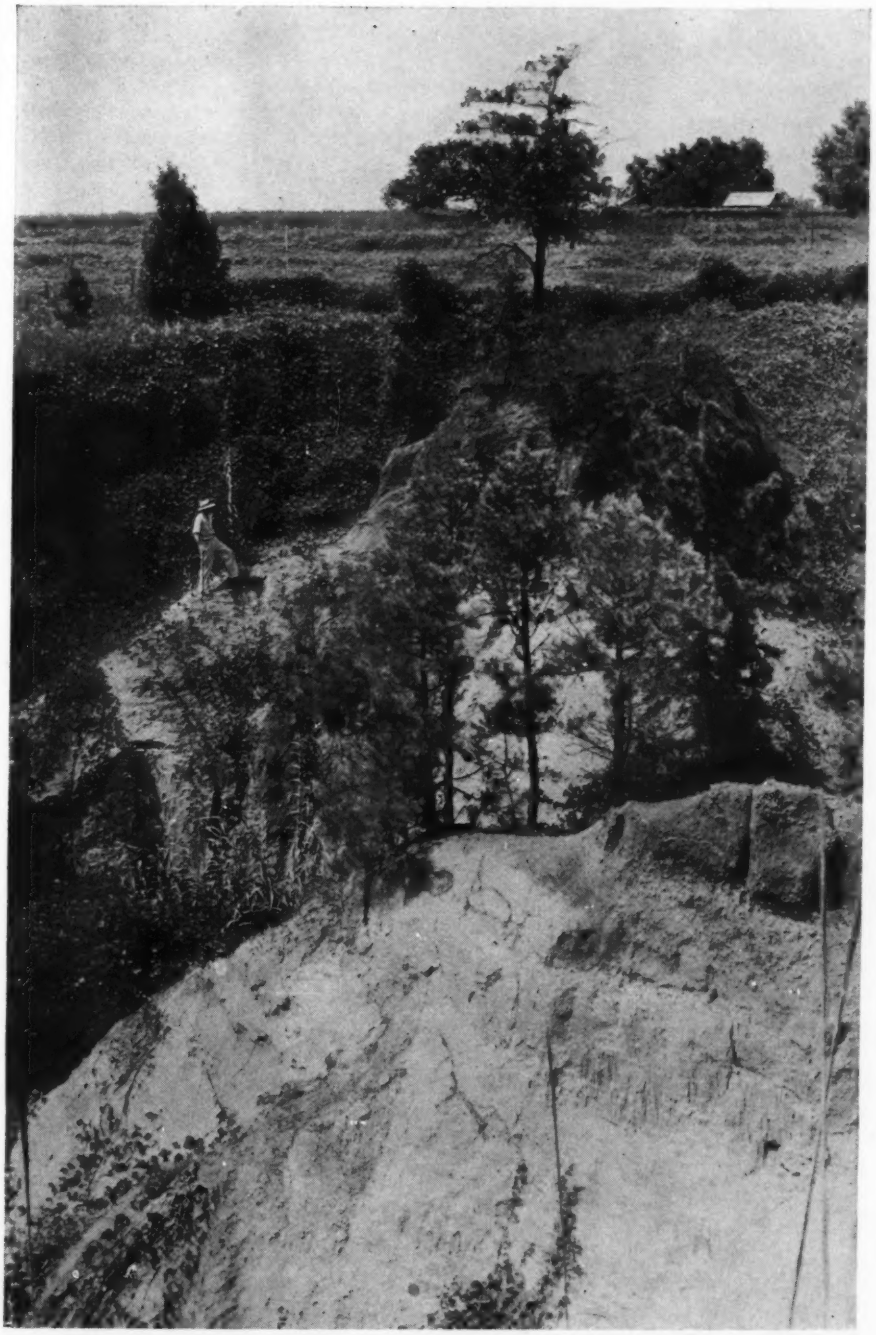
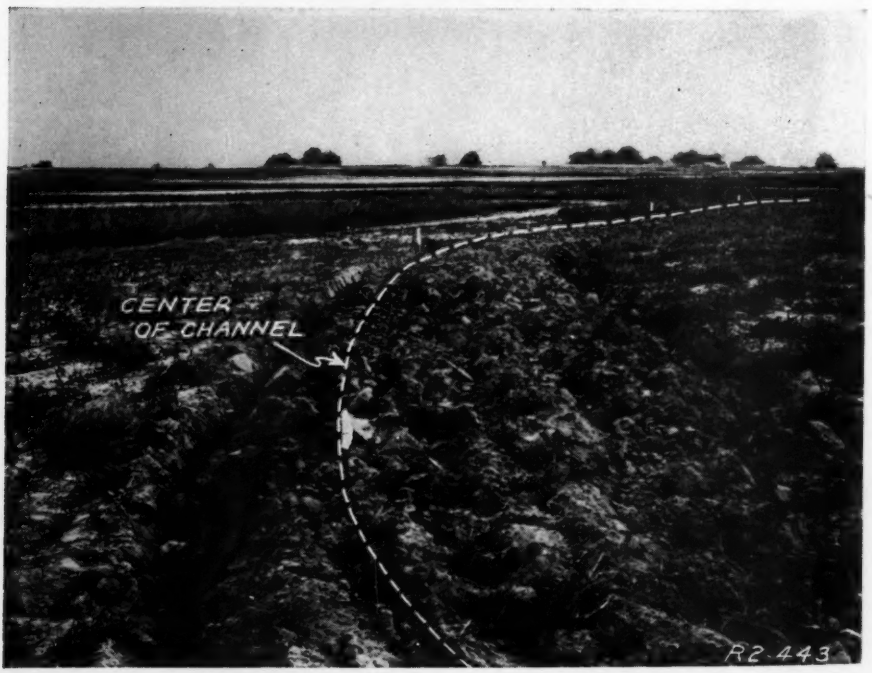
PICTORIAL



This gully, now being "healed" by kudzu, might have been prevented by slip scraping.

Above: Plowing where only guide furrows are necessary.

Below: Ground loosened for use of slip scrape.



Above: Loading slip scrape at the upper furrow.

Below: Dumping at the lower guide furrow.

Above: The terrace section after work with slip scrape.

Below: Finished terrace section after channel has been plowed out.

The Editors Talk

Allocating Potash

The distribution of potash, from refineries where produced to the fertilizer mixing industry, is to be placed under the control of the War Production Board, according to a directive recently issued by that War Agency (W.P.B. Order M-291). This control is related only to the primary distribution of potash by the producers to their immediate customers who, as is well known to the agricultural public, are principally the fertilizer mixers.

The purpose of the control is to make certain that all fertilizer mixers obtain an equitable share of the available potash supply, the experience of the past few years showing that some became apprehensive that they would not have enough. This situation created the impression that there was an actual potash shortage, while thoroughly reliable figures showed that, at current rates, production was above consumption in the past and was increasing at a rate which promised supplies even for an anticipated increase in fertilizer consumption.

The problem was more one of distribution than of supply, provided production rates could be maintained. The present purpose of the War Production Board, therefore, can be accepted as represented,—to lend its aid in promoting distribution to fertilizer manufacturers. The distribution to farmers of potash or other materials and of mixed fertilizers then comes under the supervision of the U. S. Department of Agriculture as covered by Food Production Order No. 5 governing fertilizer distribution and use. The farmer's potash requirements are thus safeguarded from refinery to field.

Figures recently released by the American Potash Institute show the agricultural potash actually delivered by the four major potash producers to their customers during the calendar year 1942. This amounted to 596,311 tons K_2O, equivalent to 1,149,720 tons of potash salts,—muriate, manure salts, sulphate, and sulphate of potash magnesia. This is an increase of 136,000 tons from the 460,316 tons K_2O delivered during 1941 and still does not represent the total, for there were additional deliveries by minor producers not included here.

Of total 1942 deliveries, 539,000 tons K_2O were consigned to buyers within the Continental United States. The balance went to buyers within Canada, Cuba, Puerto Rico, and Hawaii—the American industry thus supplying North American agriculture. Importations virtually had ceased. In November, the U. S. Department of Agriculture estimated U. S. minimum requirements for the 1942-43 fertilizer year to be 512,000 tons K_2O.

In light of the delivery record of the 1942 calendar year in excess of this amount, there would appear to be little basis for apprehension that the minimum requirements of the current fertilizer year will not be available, although the increased food production program is making increased demands on potash supplies and production facilities. The conclusion seems obvious, therefore, that the War Production Board's Order is designed to assure efficient use of this essential fertilizer in the food production program by providing for equitable distribution.

The Man in the Street

It is no secret that officials in Washington are very concerned about food supplies for ourselves and our Allies during the coming year, and this has been brought home to the "man in the street" by the issuance of point values in the new food rationing program. When it is realized that officials have found it necessary to restrict consumption of ordinary canned goods to an average of one can a week per person, the critical condition of our food supplies is apparent.

Farmers have never been known to be afraid of hard work and they are facing harder work during the coming year with a determination to do their utmost. Even this will not be enough. Their efforts must be supplemented by every available possibility of producing food by others who may have opportunities in backyards and gardens. The quantity of food produced in any one of these may be small, but the aggregate of such production should have a very important effect on the total food resources of the country. In other words, it is up to the "man in the street."

To many amateur gardeners the growing of vegetables will be a new venture. With seed and equipment limited and with the dire necessity of obtaining everything possible from the use of these supplies and our efforts and land, we cannot afford to neglect ways of insuring the success of victory gardens. This means that accurate information on soil preparation, fertilization, seed, planting, cultivation, and harvesting should be obtained. It also means that the agricultural advisory forces will have countless calls for advice. Let's hope that they can find the time and patience to give to the "man in the street."

Peanuts

In this issue, we are glad to present an article by Dr. E. R. Collins of very timely interest in view of the importance of peanuts in the food production program and entire Allied war effort. Peanuts are fast becoming one of our best sources of vegetable oils and have to be used more and more to supplement the usual animal fats. Secretary Wickard has called for the planting of 5,500,000 acres for harvesting the coming year, a 32 per cent increase over last year. In order to insure the success of this program, every factor for increasing yield of the crop should be utilized to the fullest extent. Two of these factors are the proper use of lime and fertilizer.

It must be admitted that in the past the returns obtained from these have frequently been disappointing especially in view of the fact that peanuts are a member of the legume family, which in general has a high lime requirement and needs generous supplies of phosphate and potash for best results. Considerable investigational work has given conflicting results from fertilizer applied directly to the peanuts, leading to recommendations that other crops in the rotation receive higher than normal fertilizations so as to build up the general fertility and supply the needs of peanuts in this way. This frequently would give fairly satisfactory results on a long-time farming plan, but will not take care of the expanded acreage called for under wartime conditions. It is highly desirable that a way be found to fertilize the peanuts directly so as to increase the crop this year.

Dr. Collins presents some very stimulating suggestions as to why it has not been possible to obtain expected results from fertilizers and offers possibilities for devising a way of applying fertilizer directly to peanuts with better chances of good results.

Farm Prices of Farm Products*

	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
1910–14 Average	12.4	10.4	69.6	87.6	64.8	88.0	11.94	21.59	....
1920	32.1	17.3	249.5	175.7	144.2	224.1	21.26	51.73	....
1921	12.3	19.5	103.8	118.7	58.7	119.0	12.96	22.18	....
1922	18.9	22.8	96.7	104.8	58.5	103.2	11.68	35.04	....
1923	26.7	19.0	84.1	104.4	80.1	98.9	12.29	43.69	....
1924	27.6	19.0	87.0	137.0	91.2	110.5	13.28	38.34	....
1925	22.1	16.8	113.9	171.6	99.9	151.0	12.54	35.07	....
1926	15.1	17.9	185.7	156.3	69.9	135.1	13.06	27.20	....
1927	15.9	20.7	132.3	114.0	78.8	120.5	12.00	28.56	....
1928	18.6	20.0	82.9	112.3	89.1	113.4	10.63	37.70	....
1929	17.7	18.6	93.7	118.4	87.6	102.7	11.56	34.98	....
1930	12.4	12.9	124.4	115.8	78.0	80.9	11.31	26.25	....
1931	7.6	8.2	72.7	92.9	49.8	48.8	9.76	17.04	....
1932	5.8	10.5	43.3	57.2	28.1	38.8	7.53	9.74	....
1933	8.1	12.9	66.0	59.4	36.5	58.1	6.81	12.32	....
1934	12.0	17.1	68.0	79.1	61.3	79.8	10.67	26.12	....
1935	11.6	16.1	49.4	73.9	77.4	86.4	10.57	35.56	....
1936	11.7	17.2	99.6	85.3	76.7	96.0	8.93	31.78	....
1937	11.1	19.9	88.3	91.8	94.8	107.1	10.36	30.24	....
1938	8.3	17.2	55.5	76.9	49.0	66.1	7.55	21.13	....
1939	8.7	13.6	68.1	75.4	47.6	63.6	6.95	22.17	....
1940	9.6	15.1	70.7	85.2	59.0	73.9	7.62	24.31	....
1941	13.3	19.1	64.6	94.4	64.3	84.0	8.10	35.04	....
1942	18.51	28.3	110.0	108.3	79.5	101.8	10.05	44.42	....
January	16.93	25.4	97.6	93.0	72.7	106.1	10.15	43.24	....
February	17.80	15.0	104.5	98.6	76.6	104.9	10.76	45.04	....
March	18.06	13.4	103.9	100.2	78.4	105.1	11.03	44.18	....
April	19.03	12.7	116.2	102.4	79.7	99.7	11.13	43.90	....
May	19.17	21.3	114.8	105.6	81.4	99.8	10.82	43.99	....
June	18.26	30.2	111.1	108.6	81.9	95.7	10.00	43.87	....
July	18.55	31.0	125.8	112.2	83.1	94.6	9.05	43.20	....
August	18.03	33.5	115.4	137.3	83.4	95.4	8.89	44.04	....
September	18.59	35.1	107.7	120.5	82.6	102.6	9.03	45.33	....
October	18.87	42.3	102.5	107.9	77.5	103.5	9.39	46.46	....
November	19.22	39.8	108.4	103.5	75.9	104.4	9.84	45.01	....
December	19.55	40.0	111.8	110.3	80.2	110.3	10.46	44.72	....
1943									
January	19.74	35.1	117.8	121.4	88.0	117.5	11.20	44.34	....

Index Numbers (1910-14 = 100)

1920	259	166	358	201	223	255	178	240	....
1921	99	187	149	136	91	135	109	103	....
1922	152	219	139	120	90	117	98	162	....
1923	215	183	121	119	124	112	103	202	....
1924	223	183	125	156	141	126	111	177	150
1925	178	161	164	196	154	172	105	162	153
1926	122	172	267	178	108	154	109	126	143
1927	128	199	190	130	122	137	101	132	121
1928	150	192	119	128	138	129	89	175	159
1929	143	179	135	135	135	117	97	162	149
1930	100	124	179	132	120	92	95	122	140
1931	61	79	104	106	77	55	82	79	117
1932	47	101	62	65	43	44	63	45	102
1933	65	124	95	68	56	66	57	57	105
1934	97	164	98	90	95	91	89	121	104
1935	94	155	71	84	119	98	89	165	126
1936	94	165	143	97	118	109	75	147	113
1937	90	191	127	105	146	122	87	140	122
1938	67	165	80	88	76	75	63	98	101
1939	70	131	98	86	73	72	58	103	109
1940	78	145	102	97	91	84	64	126	121
1941	107	184	93	108	99	95	68	162	145
1942	149	272	158	124	123	116	84	206	199
January	137	244	140	106	112	121	85	200	204
February	144	144	150	113	118	119	90	209	161
March	146	129	149	114	121	119	92	205	136
April	153	122	167	117	123	113	93	203	158
May	155	205	165	121	126	113	91	204	152
June	147	290	160	124	126	109	84	203	169
July	150	298	181	128	128	108	76	200	200
August	145	322	166	157	129	108	74	204	256
September	150	338	155	138	127	117	76	210	191
October	152	407	147	123	120	118	79	215	226
November	155	383	156	118	117	119	82	208	238
December	158	385	161	126	124	125	88	207	293
1943									
January	159	338	169	139	136	134	94	205	277

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11-12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated, 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16-17% ammonia, Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.71	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.69	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.30
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
January	1.69	1.41	6.96	5.77	3.34	4.71	6.30
February	1.73	1.41	6.98	5.77	3.34	5.23	6.62
March	1.75	1.41	6.48	5.77	3.34	5.46	6.93
April	1.75	1.41	6.48	5.77	3.34	5.46	6.80
May	1.75	1.41	6.29	5.77	3.34	5.46	6.97
June	1.75	1.41	5.23	5.77	3.34	4.98	6.94
July	1.75	1.41	5.99	5.77	3.34	4.86	6.80
August	1.75	1.42	5.77	5.77	3.34	4.86	6.94
September	1.75	1.42	5.69	5.77	3.34	4.86	6.97
October	1.75	1.42	5.72	5.77	3.34	4.86	6.80
November	1.75	1.42	6.06	5.77	3.34	4.86	6.53
December	1.75	1.42	5.68	5.77	3.34	4.86	6.53
1943							
January	1.75	1.42	5.68	5.77	3.34	4.86	6.53

Index Numbers (1910-14 = 100)

1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	136	129	139
1927	112	79	145	166	143	128	162
1928	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	112	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	121
1937	61	46	140	132	120	120	124
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
January	63	49	199	163	110	140	179
February	65	49	199	163	110	155	188
March	65	49	185	163	110	162	197
April	65	49	185	163	110	162	193
May	65	49	180	163	110	162	198
June	65	49	149	163	110	148	197
July	65	49	171	163	110	144	193
August	65	50	165	163	110	144	197
September	65	50	163	163	110	144	198
October	65	50	163	163	110	144	193
November	65	50	173	163	110	144	186
December	65	50	162	163	110	144	186
1943							
January	65	50	162	163	110	144	186

Wholesale Prices of Phosphates and Potash**

	Superphosphate Baltimore, per unit	Florida land pebble, 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Kainit, 20% bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.535	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	25.17	.572	.623
1939	.478	1.90	5.50	.521	.751	24.52	.570	.607
1940	.516	1.90	5.50	.517	.730	....	.573	....
1941	.547	1.94	5.64	.522	.748	25.55	.570	....
1942	.600	2.13	6.29	.522	.748	25.74	.205	....
January	.594	2.00	6.00	.535	.755	26.00	.210	....
February	.600	2.00	6.00	.535	.755	26.00	.210	....
March	.600	2.20	6.50	.535	.755	26.00	.210	....
April	.600	2.20	6.50	.535	.755	26.00	.210	....
May	.600	2.20	6.50	.535	.755	26.00	.210	....
June	.600	2.20	6.50	.471	.665	22.88	.185	....
July	.600	2.20	6.50	.503	.755	26.00	.197	....
August	.600	2.20	6.50	.503	.755	26.00	.197	....
September	.600	2.20	6.50	.503	.755	26.00	.197	....
October	.600	2.10	6.20	.535	.755	26.00	.210	....
November	.600	2.00	5.90	.535	.755	26.00	.210	....
December	.600	2.00	5.90	.535	.755	26.00	.210	....
1943								
January	.600	2.00	5.90	.535	.755	26.00	.210	....

Index Numbers (1910-14 = 100)

1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	116	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	....	87	....
1941	102	54	116	73	78	106	87	....
1942	112	59	129	73	78	106	84	....
January	111	55	123	75	79	108	85	....
February	112	55	123	75	79	108	85	....
March	112	61	133	75	79	108	85	....
April	112	61	133	75	79	108	85	....
May	112	61	133	75	79	108	85	....
June	112	61	133	66	70	95	81	....
July	112	61	133	70	79	108	83	....
August	112	61	133	70	79	108	83	....
September	112	61	133	70	79	108	83	....
October	112	58	127	75	79	108	85	....
November	112	55	121	75	79	108	85	....
December	112	55	121	75	79	108	85	....
1943								
January	112	55	121	75	79	108	85	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	142	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	157	151	112	100	131	109	80
1926.....	145	155	146	119	94	135	112	86
1927.....	139	153	139	116	89	150	100	94
1928.....	149	155	141	121	87	177	108	97
1929.....	146	153	139	114	79	146	114	97
1930.....	126	145	126	105	72	131	101	99
1931.....	87	124	107	83	62	83	90	99
1932.....	65	107	95	71	46	48	85	99
1933.....	70	109	96	70	45	71	81	95
1934.....	90	123	109	72	47	90	91	72
1935.....	108	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	121	130	126	81	50	129	95	75
1938.....	95	122	115	78	52	101	92	77
1939.....	93	121	112	79	51	119	89	77
1940.....	98	122	115	80	52	114	96	77
1941.....	122	130	127	86	56	130	102	76
1942.....	157	152	144	92	57	161	112	76
January...	149	146	139	92	56	164	111	78
February..	145	147	141	94	57	173	112	78
March....	146	150	142	94	57	171	112	78
April.....	150	151	144	94	57	171	112	78
May.....	152	152	144	94	57	169	112	78
June.....	151	152	144	90	57	151	112	69
July.....	154	152	144	91	57	157	112	74
August....	163	153	145	91	57	155	112	74
September.	163	154	145	91	57	154	112	74
October...	169	155	145	92	57	154	112	78
November.	169	156	146	92	57	158	112	78
December..	178	158	147	92	57	154	112	78
1943								
January...	182	160	...	92	57	154	12	78

* U. S. D. A. figures.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

**** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

¶ A helpful contribution to data on fertilizer consumption is furnished by "The Fertilizer Grade Survey for Virginia 1942" conducted by T. B. Hutcheson and E. Pedigo and issued as an unnumbered mimeographed pamphlet of the Virginia Agricultural Experiment Station. The data cover the fertilizer year 1941-1942 and include most of the tonnage sold in the State, certainly enough to form a good picture of the fertilizer situation. The leading grades in the order of tonnage were 2-12-6, 6-6-5, 3-8-5, 0-20-0, 3-8-3, 6-8-6, nitrate of soda, 4-12-4, 3-12-6, 0-14-6, 3-10-6, 2-12-4, 0-16-0, 2-10-6, and 2-8-4. From the tables given it would appear that around 200 different grades of mixed fertilizers and materials were sold. The 15 grades listed represent about 7 per cent of the total number of grades but account for about 70 per cent of the total tonnage. About three-quarters of the total tonnage sold was in the form of mixed goods, and the other quarter in the form of materials.

¶ Interesting data on fertilizer consumed in Vermont are given in Bulletin 496 of that Experiment Station. This publication is entitled "Commercial Fertilizers" and was prepared by L. S. Walker and E. S. Boyce. While tonnages are not given for all individual mixtures, the data presented offer a good picture of usage in the State. The arithmetical average analysis of all the analyses sold in 1942 was approximately a 5-10-9 fertilizer. This does not vary a great deal from previous years so far as ratio is concerned, although the total concentration is slightly lower. This probably was due to the disappearance from the market of some of the high-grade fertilizer materials due to the war. Other interesting tables on prices and concentrations of fertilizers are given.

"Wartime Fertilizer Recommendations," Extension Service, University of Ark., Fayetteville, Ark., December 1942, Charles F. Simmons.

"Fertilizer Recommendations for Field and Fruit Crops," Maritime Fertilizer Council, Moncton, N. B., Nov. 30, 1942, J. E. McIntyre.

"Fertilizer Grades and Recommended Rates of Application," Agronomy Dept., Univ. of Conn., Storrs, Conn., Jan. 1943, J. S. Owens.

"Wartime Fertilizer Recommendations for Delaware," Ext. Serv., Univ. of Del., Newark, Del., E. Folder 3, Dec. 1942, Claude E. Phillips and Eugene P. Brasher.

"1943 Fertilizers for South Georgia Field Crops," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Mimeo. 14, Dec. 12, 1943.

"Fertilizing Flue-cured Tobacco in 1943," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Mimeo. 16, Dec. 12, 1942.

"Effect of Nitrate of Soda on Development of the Halehaven Peach," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Bul. 493, Oct. 1942, Richard V. Lott.

"General Summary of Results, 1913-1941," Toledo Soil Exp. Field, Dept. of Agron., Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., A. G. 1023, Feb. 1942, F. C. Bauer and P. E. Johnson.

"General Summary of Results, 1912-1941," Oblong Soil Exp. Field, Dept. of Agron., Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., A. G. 1096, May 1942, F. C. Bauer and P. E. Johnson.

"Fertilizer Report 1941," Pa. Dept. of Agr., Harrisburg, Pa., Gen. Bul. 584, Sept.-Oct. 1942.

"Commercial Fertilizers," Vt. Agr. Exp. Sta., Burlington, Vt., Bul. 496, Oct. 1942, L. S. Walker and E. F. Boyce.

"Fertilizer Grade Survey for Virginia—1942," Va. Agr. Exp. Sta., Blacksburg, Va., T. B. Hutcheson and Elizabeth Pedigo.

Soils

¶ The Wisconsin Conservation League has issued a booklet entitled "The Soil," intended primarily for use in schools. The pamphlet contains a number of short chapters dealing with the fundamental importance of soils, erosion and its prevention, and soil improvement. Each chapter is written by a technical but practical expert in the subject covered, the authors being members of the staffs of the Soil Conservation Service, U. S. Forestry Service, and the University of Wisconsin. This should prove a helpful booklet to teachers and of interest to students. ¶ "Farms The Rains Can't Take" is the title to a practical bulletin on Soil Conservation prepared by K. Davis and O. E. Hays, and issued as U. S. Department of Agriculture Miscellaneous Publication 394. By means of photographs and diagrams, factors influencing erosion by water are shown, and the influence of soil cover on the amount of erosion is brought out. The contrasts in the latter case are very striking: a fallow soil losing almost 200 tons of soil per acre; a field in corn, over 100 tons; a field in barley, about 20 tons; and practically no loss from fields in clover or bluegrass. These data were obtained over a six-year period on a uniform field with a 16 per cent slope on a dairy farm near La-Crosse, Wisconsin. The run-off of rain water due to these various treatments also varied, but not nearly as much as did the difference in loss of soil. The value of terracing, strip-cropping, and rotation, so as to be able to have a practical farming system and at the same time keep the soil, is brought out.

"Conservation for Wisconsin Schools—The Soil," Coop. Ext. Serv., State of Wisconsin, Madison, Wis., 1942.

"Controlling Coastal Sand Dunes in the Pacific Northwest," U. S. D. A., Washington, D. C., Sept. 1942, Cir. 660, Willard T. McLaughlin and Robert L. Brown.

"Farms the Rains Can't Take," U. S. D. A., Washington, D. C., M. P. 394 (Rev. Apr. 1942), Kenneth Davis.

Crops

¶ Detailed information on the amounts of nutrient taken from the soil by cotton growing under present-day conditions is given by L. C. Olson and R. P. Bledsoe in Bulletin 222 of the Georgia Experiment Station, entitled "The Chemical Composition of the Cotton Plant and the Uptake of Nutrients at Different Stages of Growth." The Bulletin supplies information covering three different soils over a period of two years. The entire above-ground plant was analyzed, with data on squares and bolls given separately from the rest of the plant. Dry weight of the plants per acre is given, but only general information as to yields of crops.

The plants were analyzed for nitrogen, phosphoric acid, potash, calcium, and magnesium. The data are given in percentages and also in terms of pounds per acre for four stages of growth, with more detailed data given for the crop growing on a Cecil soil. The other two soils on which the crop was grown were Clarksville and Tifton. The heaviest crop was grown on the Cecil soil and the lightest crop on the Clarksville, with the Tifton intermediate. Total nutrient removal in general was proportional to the total crop, although there were differences in the relative amounts of the various nutrients removed on the different soils. The crop on the Clarksville soil took up relatively more nitrogen, while that on the Tifton soil took up relatively more potash. There was more calcium taken up than any other one nutrient, with nitrogen second on the Cecil and Clarksville soils, and potash second on the Tifton soil. Phosphoric acid was always absorbed the least, with magnesium usually slightly above the phosphoric acid.

On the Cecil soil, with a crop of about 2,000 pounds of seed cotton per acre, a total of 134 pounds N, 61 pounds P_2O_5, 120 pounds K_2O, 162 pounds CaO, and 61 pounds MgO, or total 538 pounds of nutrients, were taken up by the cotton plants. This was considerably more plant food than was supplied

in fertilizer and much more than is commonly applied by farmers. The remainder of the nutrients, of course, has to come from reserve supplies in the soil, left over from previous cropping or coming from the native fertility.

The operators call attention to the large amount of calcium and also appreciable amounts of magnesium contained in a cotton crop. In the past it has been common to give comparatively little attention to these nutrients for cotton. Many fertilizers contain appreciable amounts of calcium, but unless dolomitic limestone is used to neutralize the fertilizer, a rather recent practice, very little magnesium would be added to the soil in fertilizer. These nutrients, therefore, are assuming importance in the growing of cotton, particularly on certain soils.

The data on the amounts of nutrients absorbed at different periods of growth are interesting and significant. Comparatively small amounts of nutrients were taken up by the plants during the first 90 days, but during the next 15 days twice these quantities of nutrients were taken up. Considerable nutrients also were taken up during the two following 15-day periods up to 135 days. During the last 15-day period, however, many cases of apparent negative absorption were recorded. Part of this was real negative absorption with nutrients returning to the soil either through the roots or by leaching from mature parts of the plant. Part of this effect also is due to the fact that there were inevitable losses of leaves and other parts of the plants as they approached maturity.

Nitrogen absorption begins earlier than the absorption of other nutrients and reaches the peak about the same time as the others, but falls off more rapidly towards maturity. Potash is absorbed during a longer period of growth of the plant than some of the other nutrients, and continues to be absorbed until the plant approaches maturity. Phosphorus and magnesium are absorbed in large quantities only from the peak of the growing period to maturity, and calcium tends to be absorbed in appreciable quantities up to maturity.

Many other interesting observations could be made from the data given, but space does not permit going into more detail here.

¶ Experimental work with potatoes that is now in progress and results being obtained are given in Maine Agricultural Experiment Station Bulletin 411-C entitled, "Potatoes." It is at once apparent on seeing this Bulletin that a great deal of work is being conducted on this crop, which is so important in Maine agriculture. Much of the Bulletin is devoted to investigations on diseases which have been troublesome, particularly bacterial ring rot, net necrosis or leafroll, stem-end browning, purple top, rhizoctonia, mahogany browning, and late blight.

The use of resistant varieties, disease-free seed, and sanitary measures appears to be an effective way of overcoming bacterial ring rot, in fact the Bulletin states that if every grower would adopt proper measures, the disease could be largely eliminated from the State within a period of three years. There are a number of factors involved in the control of net necrosis or leafroll. Resistant varieties are a possibility; reduction of aphid infestation and control of plants on which they could feed, early harvesting, low storage temperatures, and fertilization all appear to be means of attacking this disease. It was found that at the Experiment Station farm fertilizers higher in chloride caused more net necrosis than when potassium sulphate or potassium nitrate or combination of these with potassium chloride were used. Less detailed work on some other farms, however, did not fully confirm the effects of chloride on net necrosis.

The nature or cause of stem-end browning has not yet been found. Not all varieties are subject to this. Fertilization appeared to be a factor, here again fertilizer higher in chlorine causing more stem-end browning. These results were not entirely consistent on the various farms on which the trials

were conducted. Storage of potatoes at a low temperature appears to be a definite aid in reducing stem-end browning.

Investigations on the use of green manure crops have been begun and preliminary results show that crimson clover produces higher potato yields than corn when turned under, although the latter will add more total organic matter to the soil. A leguminous cover crop turned under will not supply all the nitrogen needed by potatoes, as is shown by a striking color cut on the front cover of the bulletin. Applying part of the fertilizer to the cover crop and the remainder to the potatoes did not produce quite as good yield of potatoes as when all the fertilizer was applied to the potato crop.

Fertilizers containing 10% potash produced the highest yields, while the sulphate form produced higher yields than the chloride form. The so-called Hi-Lo fertilizer placement did not give any significantly better yields than the standard band placement of fertilizer.

Studies on the absorption of nutrients by potatoes show that a 400-bushel crop (145 barrels) per acre will absorb about 120 to 160 pounds of nitrogen, 25 to 30 pounds of phosphoric acid, 200 to 250 pounds of potash, 60 pounds of calcium oxide, 30 pounds of magnesium oxide, and 10 to 12 pounds of sulphur.

Other data and studies too numerous to give here are included in this Bulletin.

¶ With the scarcity of labor, the practice of direct seeding of tomatoes in the field instead of transplanting probably will be given more consideration this year than ever before. A pamphlet giving practical information on this subject has been prepared by Roscoe Fraser and published as Purdue Agricultural Extension Service Bulletin 281 entitled "Tomatoes by Direct Seeding." The advantages and disadvantages of direct seeding are set forth, and under suitable conditions of soil and equipment, the advantages appear to outweigh the disadvantages. Directions on seedbed preparation, seeding, fertilizing, cultivation, and thinning are given. A two-row planter can be rigged up by attaching garden seeders to a corn planter, applying the fertilizer by means of the corn planter. Direct seeding would appear to have greatest possibilities in areas where soils are not too heavy and where they are well supplied with organic matter so as to prevent surface caking.

"Physiological Studies of Yield, Quality, and Maturity of Marsh Grapefruit in Arizona," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., T. Bul. 97, Nov. 15, 1942, William E. Martin.

"Growing Tomatoes in Arkansas," Ext. Serv., Univ. of Ark., Fayetteville, Ark., Cir. 428, June 1942, V. M. Watts, Dwight Isely, and S. B. Locke.

"The Rainbow Forest Plantations," Agr. Exp. Sta., New Haven, Conn., Bul 464, Sept. 1942, Henry W. Hicock.

"The Effects of Cutting Systems on Alfalfa," Agr. Exp. Sta., Univ. of Conn., Storrs, Conn., Bul. 242, Nov. 1942, B. A. Brown and R. I. Munsell.

"A New Cotton for South Georgia," Ga. Coastal Plain Exp. Sta., Tifton, Ga., Mimeo. 15, Dec. 1, 1942.

"Extension's Task Force in Hawaii," An. Rpt., 1941-1942, Hawaii Agr. Ext. Serv., Honolulu, Hawaii, Bul. 39, Dec. 1942.

"Yields of Corn Hybrids Harvested for Silage," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., Bul. 494, Oct. 1942, W. B. Nevens and G. H. Dungan.

"Conserve, Improve, Produce," Ext. Serv., Mass. State College, Amherst, Mass., Sp. Cir. 88, Aug. 1942.

"Growing Fruits for Home Use," Ext. Serv., Mass. State College, Amherst, Mass., E. Leaf. 208, Oct. 1942, W. H. Thies.

"An Illustrated Guide to Identification and Landscape Uses of Mississippi Native Shrubs," Miss. Agr. Exp. Sta., State College, Miss., Bul. 369, July 1942, F. S. Batson.

"Lettuce Production Under Mississippi Conditions," Agr. Exp. Sta., State College, Miss., Cir. 107, August 1942, L. R. Farish.

"Leoti for Starch," Agr. Exp. Sta., Univ. of Nebraska, Lincoln, Nebr., Cir. 69, May 1942, R. L. Cushing.

"Internal Breakdown of Table Beets," Agr. Exp Sta., Cornell Univ., Ithaca, N. Y., Memoir 246, June 1942, Oscar A. Lorenz.

"Budding and Grafting on Hardy Apple Stocks," Agr. Exp. Sta., Wooster, Ohio, Sp. Cir. 65, July 1942, C. W. Ellenwood, T. E. Fowler, and C. A. Greene.

"Science for the Farmer," Agr. Exp. Sta., State College, Penna., A. R. 55th 1942, Bul. 429, Aug. 1942.

"The Penn State Ballhead Cabbage," Agr. Exp. Sta., State College, Pa., Bul. 430, Aug. 1942, C. E. Myers.

"Easier Gardens for Wartime," Agr. Ext.

Serv., Univ. of Tenn., Knoxville, Tenn., Pub. 268, Jan. 1943, W. C. Pelton.

"Fifty-Fifth Annual Report, 1941-1942," Vt. Agr. Exp. Sta., Burlington, Vt., Bul. 495, Sept. 1942, J. L. Hills.

"Garden for Victory," Ext. Serv., W. Va. Univ., Morgantown, W. Va., 1942, A. L. Keller.

"Small Fruits for Your Victory Garden," Ext. Serv., W. Va. Univ., Morgantown, W. Va., 1942, R. S. Marsh and W. H. Childs.

"The Home Garden," Ext. Serv., W. Va. Univ., Morgantown, W. Va., Cir. 317 (Rev.), March 1942, A. L. Keller.

"Report of the Chief of the Office of Experiment Stations, 1942," U. S. D. A., Washington, D. C., Sept. 15, 1942, James T. Jardine.

"Report of the Secretary of Agriculture 1942," U. S. D. A., Washington, D. C.

"Potato Production in the Southern States," U. S. D. A., Washington, D. C., Farmers' Bul. 1904, Aug. 1942, E. L. LeClerg.

"More Food Through Conservation Farming," U. S. D. A., Washington, D. C., F. B. 1909, Sept. 1942, Arthur T. Semple.

"Snap Beans for Marketing, Canning, and Freezing," U. S. D. A., Washington, D. C., F. B. 1915, Sept. 1942, B. L. Wade.

"The Agriculture of Colombia," U. S. D. A., Washington, D. C., Foreign Agr. Bul. 1, Oct. 1942, Kathryn H. Wylie.

"The Home Fruit Garden in the Northeastern and North Central States." U. S. D. A., Washington, D. C., Leaf. 227, Aug. 1942.

"Wartime Farming on the Southern Great Plains," U. S. D. A. Soil Conservation Serv., Washington, D. C., M. P. 496, 1942.

"Factors Influencing the Nutritive Value of the Tomato," U. S. D. A., Washington, D. C., Oct. 1942, M. P. 502, K. C. Hamner and L. A. Maynard.

"Day Length and Crop Yields," U. S. D. A., Washington, D. C., M. P. 507, Sept. 1942, M. W. Parker and H. A. Borthwick.

Economics

¶ The Bureau of Agricultural Economics of the U. S. Department of Agriculture has prepared a mimeographed pamphlet entitled "The Preparation of Statistical Tables." This is to serve as a guide to the staff of the Bureau when they are preparing material for publication. It represents the experience of a large number of authors and the result of careful consideration by printers and form experts of the Government and may well serve as a guide to economists and authors in other fields when preparing tables and technical material for presentation. It answers many perplexing problems on how to set up tables, whether to write out numbers or use figures, how to set up columns of figures, insert footnotes, and many other items of this nature.

¶ The 1943 Agricultural Outlook Charts issued by the Bureau of Agricultural Economics of the U. S. Department of Agriculture present a wealth of information relating to American agriculture. Data covering past years and running up through 1942 are presented in the form of tables and charts. Most of the data are related to prices and income, although some information on production and stocks of products on hand is included. The chart showing the ratio of prices received to prices paid, in other words the relative buying power of farmers, shows a marked and rather steady climb since 1940. It is now moving well above what is considered normal, the first time since 1920 that this has occurred.

"Price Comparisons for Arkansas Rice," Agr. Exp. Sta., Univ. of Ark., Fayetteville, Ark., Bul. 423, June 1942, Orville J. Hall.

"Farm Adjustment Opportunities in Greene County, Georgia," Ga. Exp. Sta., Experiment, Ga., Bul. 221, Oct. 1942, M. C. Conner, W. E. Hendrix, C. R. Sayre, and W. T. Fullilove.

"Suggested Hawaiian Grades for Certain Fruits and Vegetables," Agr. Ext. Serv., Univ. of Hawaii, Honolulu, Hawaii, Cir. 156, Dec. 1942.

"Illinois Crop and Livestock Statistics," Ill. Dept. of Agr., Springfield, Ill., Cir. 443, 1942.

"Trends in Land Use and Related Changes in Knott County, Ky., 1929-1939," Agr. Exp. Sta., Univ. of Ky., Lexington, Ky., Bul. 428, June 1942, R. H. Allen and Charles G. Deaton.

"A Study of Land Use in Thirty-one Towns in Aroostook County, Maine, Agr. Exp. Sta., Orono, Maine, Bul. 413, Aug. 1942, Andrew E. Watson.

"Migratory Beet Workers in Michigan," Agr. Exp. St., East Lansing, Mich., Sp. Bul. 319, Sept. 1942, J. F. Thaden.

"Dairy Opportunity Areas in New Hampshire," Agr. Exp. Sta., Univ. of N. H., Durham, N. H. Bul. 340, June 1942, Harry C. Woodworth and John C. Holmes.

"An Economic Study of Land Utilization in Schuyler County, New York," Agr. Exp. Sta., Cornell Univ., Ithaca, N. Y., Bul. 781, May 1942. Lawrence B. Darrah.

"Size of Farm Units as Affected by the Farming of Additional Land," Agr. Exp. Sta., Wooster, Ohio, Bul. 637, Oct. 1942, R. C. Headington and J. I. Falconer.

"Pennsylvania Crop and Livestock Report 1940-1941," Pa. Dept. of Agr., Harrisburg, Pa., Gen. Bul. 582, July-Aug. 1942.

"Pennsylvania Crop and Livestock Report 1940-1941," Pa. Dept. of Agr., Harrisburg, Pa., Gen. Bul. 583, July-Aug. 1942.

"Economics of Soil Conservation in West Virginia," Agr. Exp. Sta., Univ. of W. Va., Morgantown, W. Va., Bul. 305, Aug. 1942, E. C. Weitzell.

"1943 Agricultural Conservation Program Bulletin," U.S.D.A., Washington, D. C., ACP-1943, Dec. 3, 1942.

"The Marketing of Greens," U.S.D.A., Washington, D. C., Cir. 644, April 1942, J. W. Park and M. E. Smith.

"Minimum Prices Currently Supported by the Department of Agriculture," U.S.D.A., Washinton, D. C., Nov. 6, 1942.

"1943 Agricultural Outlook Charts," U.S. D.A., Washington, D. C., October 1942.

"The Preparation of Statistical Tables," U.S.D.A., Washington, D. C., Revised Sept. 1942.

"Crop Yields and Weather," U.S.D.A. and U.S.D.C., Washington, D. C., M.P. 471, Feb. 1942, Louis H. Bean.

Maintaining Fertility When Growing Peanuts

(*From page* 10)

This effect is more pronounced on Virginia type than on Spanish peanuts. Potash applications to peanuts, particularly the Virginia type, which approach the amount of potash removed by the crop (the equivalent of 175-200 lbs. of muriate of potash) do not appear practical. Preliminary results from a three-year rotation of cotton, peanuts, corn, and soybeans show that significantly higher yields of cotton were obtained when the potash was applied directly to the cotton rather than applying half to the peanut crop and half to the cotton crop. These factors all indicate the advisability of maintaining the potash level of the soil by increasing the applications to other crops in rotation with peanuts, and applying small amounts of potash (50-75 lbs. muriate of potash per acre) directly to the peanut crop.

How to Apply

Because of injury to germination, the potash should be placed in bands to the side of the seed or top-dressed as the peanuts come through the ground. With recommended cultural practices, a weeder is run over the land 4 to 5 days after planting to level any ridge resulting from planting. This leaves the top-dressed potash at ground level and below the bed which is later thrown up for the development of the peanuts.

Side applications result in the potash being mixed with the soil in the zone of the developing peanuts when the soil is thrown up to make a high bed. More unfilled nuts have resulted from side applications than when the potash is applied on top of the peanuts as they come through the ground, and the soil with normal potash level is used in making the bed.

The Value of Hay

Peanuts are well adapted to supplying the hay requirements of the farm. The only labor necessary is baling and hauling the hay to the barn as it comes from the picker (Fig. 7). Because of the value of the hay and the convenience in harvesting, it is not probable that the average farmer will discontinue the use of peanut hay. The fertilizing value of the hay, or the value of the manure produced from animals consuming the hay, should not be underestimated and the greatest care should be taken in handling the hay, conserving the manure, and returning them to the land. One ton of peanut hay contains fertilizer nutrients equivalent to

Fig. 8. Peanut field after the peanuts were harvested and the cover crop sown. Note that practically all vegetation has been removed from the soil.

approximately 246 lbs. of nitrate of soda, 49 lbs. of lime, 29 lbs. of 18% superphosphate, 82 lbs. of 50% muriate of potash, and 14 lbs. of 92% magnesium oxide. The fertilizing value of one ton of hay, exclusive of the organic matter, would cost around $9.00 to replace in a fertilizer bag. On the basis of one ton of unshelled nuts and two tons of hay per acre approximately 90% of the calcium, 80% of the magnesium, 80% of the potash, 56% of the nitrogen, and 20% of the phosphoric acid are in the hay. Returning the hay to the land, directly or through animal manures, would overcome an appreciable part of the soil-depleting properties of peanuts.

The War Production Board has set up large production goals for peanuts in the Southeastern States. It is imperative that these peanuts be produced with the most efficient use of land, fertilizer, and labor, at all times

Fig. 9. Corn in a two-year rotation of corn and soybeans with the soybeans harvested for hay. The four rows on the left were fertilized with nitrogen and potash; the four rows on the right received nitrogen and phosphate.

Fig. 10. Potash deficiency on cotton. Cotton fertilized with 400 lbs. of 4-8-4 following peanuts receiving 400 lbs. of gypsum (landplaster) on the foliage. Left, no top-dressing; right 200 lbs. 10-0-10 top-dressed.

keeping in mind the maintenance of soil fertility for other crops. This objective can be accomplished by growing peanuts in rotation with other crops, with the peanuts preceded by a heavily fertilized crop such as cotton or tobacco; returning the hay or animal manures to the soil; applying lime, preferably dolomitic limestone because of the magnesium content; applying small amounts of potash to the peanuts; balancing a soil-fertility program by increasing the applications of potash to all other crops in the rotation; and planting winter cover crops to maintain the organic matter supply of the soil.

Victory Gardeners Produce and Preserve

(*From page* 19)

planted and permitted to grow in the garden.

The next step of importance is the arrangement of the vegetables in the general garden plan. The rows should be straight and run the full length of the garden, not to beds. Each vegetable or fruit should be allotted a certain area, grouping those that mature at approximately the same time. Information on amount of seed for 100 feet of row and what the average production should be for so much seed is available to all. The garden plan should be followed in planting.

To feed the body through garden produce, the plant should first be fed through the soil. A deep, loose, well-drained, and fertile soil that is high in organic matter and available plant food is most acceptable. Not every gardener finds such conditions available, but most any soil with body to it, and that has drainage, could be built up to a very productive soil. Every year the garden soil needs organic matter in some form, supplemented with commercial fertilizer. The organic matter could be manure or some soil-building cover crop. Ten to 30 or even 40 loads of manure per acre broadcast during the winter would mellow the soil. Some

of the manures these days are lacking in sufficient amount of phosphoric acid and potash, and it is recommended that 25 to 30 pounds of 0-20-20 be broadcast with each load of manure. When the garden is plowed, the plant food will be placed where it will do the most good—in the lower half of the furrow.

Victory Garden Fertilizer

When manure is not available, the garden should be seeded to rye or similar hardy winter cover during the late fall. Those gardeners having only hand tools should broadcast the rye and cover the seed with a garden cultivator. Two to three weeks before the spring plowing 250 to 300 pounds per acre of a 3-12-12 fertilizer or a 3-8-7, the new Victory Garden Special fertilizer, should be scattered over the growing rye. The green plants will absorb and hold the available plant foods in the roots, stems, and leaves and release the food as the vegetable plants need it. This is one way of getting more organic matter into the soil and yet have the advantages derived from broadcasting commercial fertilizer.

The variety preference, the type and kind of soils, the available plant foods, and the latitude will somewhat determine the time of maturity of the vegetables. To be on the safe side, as an example, one or two varieties of beans are recommended and a large enough supply should be ordered to make more than one planting. The late summer and fall gardens are just as important as the early spring planting. The garden seed and plants should be ordered early.

Purdue University Agricultural Extension Leaflet No. 222, "The Family Garden," lists the approximate amounts of seed for a 100-foot row, the probable yield, and suggestions on when and what to plant. This is an aid to timing the plantings of such vegetables as carrots, beets, cabbage, turnips, and other winter-keeping vegetables to mature just before the cold weather comes. Availability of these vegetables is then extended, for they will be ready to go into storage just before the cold weather, growing up to the very last minute.

Many Indiana landlords are cooperating 100 per cent with their tenants. The landowner realizes that a good tenant is worth keeping and encourages gardening. Many landlords have purchased small fruit plants and bushes along with perennial vegetables, such as rhubarb and asparagus, for a permanent garden. He knows that with proper care and management his tenant will not be running to the grocery or market to buy garden produce. The tenant will grow the products at home at a great saving and have better quality, as there should be little, if any, delay from harvest to processing.

Placing the garden near the house or along the road is just like an advertisement or a decorative show window. A row or two of flowers adds much to the garden and a few flowers on the table should add just as much to the meal.

Hoosier Garden Goals

Hoosier gardeners have a food budget to meet that will assure the family the proper foods during the winter season. A minimum of 60 quarts of vegetables and 50 quarts of fruit per person, canned from their garden, is the requirement. Those meeting this standard are awarded a garden club pin. The winter supply of food does not stop with the canned goods, but also includes cabbage, carrots, and other stored products. Although a good per cent of all past reports shows many are meeting the established goal, there is yet room for improvement. This year's reports will no doubt break all records if the balance of the State is like the first two reports just received. Two counties, reporting for 564 representative families, canned 246,829 quarts of fruits and vegetables from all sources placed 12,403 pounds in lockers, and stored 8,872 bushels. These same families canned 8,529 quarts of meats, froze 39,321 pounds in lockers, and cured 22,162 pounds. Perhaps this is one of the good reasons why Hoosiers are going to live at home and enjoy it.

Building Terraces With Slip Scrapes

(*From page* 26)

Southeast terraced with slip scrapes is being farmed on the contour. Farmers use terraces as guidelines for contour plowing and cultivation. In addition to keeping the soil from washing, terraces and contour tillage prevent rain from carrying away valuable plant nutrients. The moisture that is retained in the soil through the use of these practices often is the difference between success and failure of a crop during drought.

Farmer experience, too, has shown that contour farming as contrasted with the straight up-and-down hill method of plowing and cultivating takes less power and fuel for operating farm machinery. The machinery follows a gently winding course on the level, instead of a straight path with up and down grades. Likewise, contour farming is easier on mules and horses as they do not have to pull up hill.

This year throughout the Southeast small farmers as well as farmers with large farms are bent on producing more food and other crops essential for war purposes than they did in 1942. Naturally, making each acre produce to its limit will depend to a great extent on the condition of the soil and the way it is handled.

Small farmers need not let their cropland go unterraced for the lack of power machinery or money to hire the work done. By using the slip-scrape method developed by Kearley they can do the work rapidly and economically. Moreover, putting the slip scrape to work will help them do their part in keeping Kearley and thousands of other soldiers well fed for the dangerous and important job Uncle Sam has assigned them to do.

Take Better Pictures

By *Henry H. Graham*

Twin Falls, Idaho

PHOTOGRAPHY has increased in popularity by leaps and bounds during the past few years. Ten cameras are in operation where once there was one. Thousands of interesting pictures are taken annually, but not nearly enough photographs are taken in rural communities—by the people who live there. The farm (any farm) is extremely rich in picture possibilities. In fact, a rural community offers more fine subjects for pictures than any other community.

What are some of the good subjects for farm photos? They are legion, consisting of everything from planting crops to harvesting them and from newborn chicks to newborn calves. Farm life is so rich, varied, and interesting, it's a shame more of it isn't recorded on film.

Spring planting scenes are lovely. The countryside is beautiful at this time of the year, but be sure to get someone in each picture of this kind, preferably the farmer at his work. And don't forget to use a filter over the camera lens for all photographs in which sky appears. A yellow filter, which is nothing more than a piece of colored optical glass, does all sorts of wonderful things. However, the main

thing it accomplishes is to darken the sky by holding back the intense blue light and permitting those fleecy cumulus clouds to register on the film. Unless a filter is used, the sky is overexposed, printing white, and the clouds are lost through lack of contrast. Filters cost little and add much to outdoor pictures.

Suggested Subjects

Other good photographic subjects are hoeing, flower planting, watering, picking, weeding, fruit harvest, grain threshing, and corn husking. These are typical farm scenes that make fine additions to any album. No album ever has too many pictures. They are appreciated more and more as the years pass.

Those downy little chicks are cute, so why not pose little sister or little brother feeding them or holding one of them? This makes a grand shot. Every effort should be made to take pictures that tell a story. They are much better than those of people who are merely staring at the camera.

Young Jimmy is justly proud of that new calf and considers it the most beautiful creature in the world. Then get out your camera and record him with the calf. Choose an appropriate background. If he's wearing dark-colored clothes, select a light-hued background so that he will show to advantage. Get him feeding the animal, or, if he prefers, show him holding it in his arms and admiring it.

Who gathers the eggs on your place? Maybe Sue does, or her brother, Dave. It doesn't make any difference. "Shoot" him or her putting the eggs in the basket. Then there are milking scenes, if the light is good enough to capture them. And when friend husband does the chores, picture him at that, too. You won't need any filter over the lens for these close-up shots. Just the plain lens will be sufficient.

Probably you have some dogs and cats on your farm. Picture the felines drinking from a bowl of milk, and the canines attacking the remains of the family dinner. Pets of any kind make good photographic subjects. The more you can combine children and pets in your pictures, the more appeal they will have. Children and pets just naturally seem to go together.

Be sure to do plenty of shooting during the winter months. Snow is probably the most photogenic thing in all Nature. It photographs beautifully. Such scenes as bobsleds moving down the white country roads, drifted highways and fences, wet snow clinging to tree branches after a new fall, snow shoveling—these are only a few of the winter possibilities. You can also make effective pictures of the children pulling each other on their sleds, skating on a pond and building snow figures in the yard. Take your winter scenes fairly early in the morning or in the late afternoon. This is for the sake of getting shadows which are longer early and late than in midday. Choose sunny days for snow pictures as they provide more sparkle, and, of course, there are shadows when the sun shines. Don't forget the yellow filter for snow scenes. It will darken the shadows, making them more pronounced.

Follow Recommendations

If you are accustomed to taking pictures, you will have little trouble with exposure. If not, follow the recommendations that come with the film. Remember, however, that sunlight on snow is very intense, and it is easy to give the film too much light. Modern films, however, have so much latitude that they can take care of a good deal of under- or over-exposure.

You need not own an expensive camera in order to record the many interesting activities on your farm. Plenty of fine pictures have been taken with simple box cameras. Of course, if you have a machine with a fast lens, you will be able to take photographs on dull days. But in good light, box outfits will record practically anything you wish to photograph. Be on the lookout for good snapshot material. It is all around you.

Wartime Fertilizer Recommendations

REALIZING that the entire agricultural program is constantly shifting, and in an effort to aid farmers in their food production program, the aggressive Clemson College Extension Service of South Carolina has worked out wartime fertilizer recommendations which are included in a circular prepared by H. A. Woodle, Extension Agronomist, and E. H. Rawl, Extension Horticulturist.

Due to a shortage of certain nitrogenous materials, the Extension experts are recommending that legume cover crops are more important now than ever. They point out, too, in most cases failures of winter legumes have been due to high soil acidity, lack of inoculating bacteria, insufficient available phosphoric acid, and insufficient potash. All of these factors, they say, may be corrected by the proper use of limestone, phosphate, and potash fertilizers and by proper inoculation of the legume seed. The growing of green manure crops is a sound program under normal times, but is doubly important in emergencies of nitrogen shortages.

"Many factors must be considered in deciding upon the quantity and quality of fertilizer which is most economical for profitable crop yields," the South Carolina Extension experts declared. "Soil type, soil fertility, soil acidity, previous crops, previous fertilization, deficiency symptoms, characteristics of crop to be grown, method of applying fertilizer, and other similar factors must all be taken into consideration in deciding upon the kind and amount of fertilizer to use on a particular crop. Therefore, fertilizer recommendations must necessarily be of general nature unless all factors are known. It should also be remembered that fertilizer ratios and analyses are not as important as pounds of plant nutrients per acre."

Speaking of soil types, Messrs. Woodle and Rawl remind the farmers that different types require different treatments and give, as examples, slate soils deficient in potash and nitrogen, and basic soils usually deficient in potash.

Referring to soil fertility, they declare as a rule poorer soils should receive a fertilizer with a wide ratio such as 4-12-4, while the fertile and highly productive soils should receive a fertilizer with a narrow ratio, such as 7-7-7.

Other factors which determine the kind and amount of fertilizer to use, together with comments by the Extension agronomist and horticulturist, follow:

The use of lime may increase the effectiveness of the fertilizers used. Most crops grown in South Carolina make more efficient use of fertilizers when the soil reaction is only slightly acid; the amount and kind of fertilizer will vary greatly according to whether or not the preceding crop was heavily fertilized, or a legume green-manure crop was turned under.

Potash is usually deficient following lespedeza. The amount and kind of fertilizer used will also depend upon the amount of farm manure which is used; different crops remove varying amounts of plant nutrients, thus demanding varying fertilizer treatment. Intensive fertilization gives greater returns when applied to crops with a high per acre value, such as tobacco; experience with growing plants and the ability to recognize deficiencies serve as an excellent guide in judging probable response to particular fertilizer applications; time of application and placement of the fertilizer materially affect the efficiency of fertilizers, particularly in the case of row crops.

Greatest efficiency is obtained by plac-

ing the fertilizer in bands, about 1½ to 2 inches on each side and just beneath the seed level. Relatively large amounts of soluble fertilizers, such as nitrates and potash, should not come in direct contact with the seed. Where placement distributors are not available, the fertilizer should be applied ahead of planting and mixed with the soil; good land preparation, timely seeding, planting of good seed of adapted varieties, proper cultivation, and similar practices produce greater yields and provide for more efficient use of fertilizers.

And finally, the season affects fertilizer benefits to such an extent that no soil can be expected to give the same response to a given amount and kind of fertilizer in different years. Therefore, the farmer who more thoroughly understands his soils and crops is better able to select the proportions and quantities of fertilizer which will produce higher crop yields.

Feeding Minerals by Way of the Soil

(*From page* 16)

tend to disappear with increasing intensity of agriculture, since most soils must be limed and phosphated for economic yields. However, there still remains the possibility that animals would profit by a more abundant supply of minerals than the moderately limed and fertilized crops will contain. The question then arises, shall these be supplied by way of the soil, by the use of high-mineral protein supplements, or by direct addition of inorganic salts to the feed.

It is seldom that as much as 50% of any mineral element which is applied to a soil can be recovered in the harvested crop. Consequently, to feed minerals to the animal by way of the soil is not an economic procedure, unless the advantages from so doing more than offset this disadvantage. The smallness of the percentage recovery is due in part to losses by leaching and in part to the competitive power of the soil for certain of the elements, of which phosphorus is the best example.

Some evidence on the phosphate-fixing capactiy of soils and its effect on the yield and phosphate content of the crop is shown in table 3. In the tests from which these data were obtained, 10-inch depths each of the A and B horizons of the several soils were placed in large cylinders, the still lower depths of which were filled with subsoil natural

TABLE 3.—PHOSPHATE-FIXING CAPACITIES OF SOILS IN RELATION TO YIELD AND PHOSPHORUS CONTENT OF ALFALFA GROWN ON THEM

Soil Type	Phosphorus Fixing Capacity* In Tons of 20-Per Cent Superphosphate	Yield Lbs.**	Phosphorus Content Per Cent***
Dover loam	15.0	3150	0.33
Collington loam	19.7	2640	0.33
Bermudian silt loam	19.9	3260	0.36
Dutchess shale loam	20.0	2440	0.32
Sassafras loam	30.4	2110	0.24
Merrimac silt loam	51.2	2170	0.23
Lansdale silt loam	60.6	1910	0.27
Penn silt loam	124.9	770	0.20

* Per 2 million pounds of the original A-horizon soil before it had been limed.
** Yield of dry matter of first crop of alfalfa hay, calculated on an acre basis.
*** Percentage of phosphorus in 3-inch-length cuttings taken from the top portions of the plant, on dry-matter basis.

to the cylinder area. The soils were all treated with dolomitic lime to an estimated pH value of approximately 7.0. They were then uniformly supplied with small quantities of trace elements and were given the equivalent of a 10-ton-per-acre application of manure and a 1,000-pound-per-acre application of a 5-10-10 fertilizer.

The significance of the figures shown in table 3 lies not in the totals but in the relative amounts fixed. Thus, Dover loam has relatively little phosphate-fixing tendency, whereas Penn silt loam has a very high capacity to take this material out of solution. It has long been known that the percentage recovery in plants of applied phosphorus is very low, usually amounting only to between 10 and 30%, depending upon the phosphate-fixing capacity of the soil and the manner in which the fertilizer containing the phosphorus is placed in the soil. Although the soil treatments had been standardized, and relatively liberal applications of lime, manure, and a high-phosphate fertilizer had been made, the yields and phosphorus content of alfalfa hay were widely different. Thus the hay yields varied between 770 and 3,260 pounds per acre and the phosphorus content of the dry hay between 0.20 and 0.36%. Further examination showed that the calcium content of these same samples of alfalfa varied between 1.23 and 2.90%, and the magnesium content between 0.15 and 0.45%, depending upon the soil on which the alfalfa was grown.

Fertilizer Consumption

The consumption of liming materials and fertilizers in the United States already totals nearly 25 million tons annually. Most of this tonnage is sold in the eastern and southern states; the concentration of its use in these areas being the result of the greater agricultural age of the soils, the higher rainfall to which they have been subjected, the greater density of the population and resulting intensity in production, and the convenience to the natural supplies of nitrate and phosphate.

But when the virgin fertility of the soils of the prairie and plain states has also been exhausted, fertilizer tonnages will have to be greatly increased. For example, the great State of Iowa used some 17,000 tons of fertilizer on its 34 million acres of farm land in 1941, whereas New Jersey, with a farm area one-eighteenth that of Iowa, consumed 184,000 tons of fertilizer that year. This means that the rate of consumption of fertilizer in New Jersey is over 200 times that of Iowa.

Amounts to Use

It is one thing to use fertilizers up to their economic limits in terms of crop yields, and quite another to use them in such amounts as may be required to raise the mineral content of plants to equal that of the same species when growing on soils naturally containing large stores of available mineral elements. It appears probable that the needs of animals and the desires of the nutritionist would best be served by the combined use of three procedures: (a) using such amounts of lime and fertilizer as are required to guarantee the successful growth of economic yields of the high-mineral legume hay and forage crops on the better soil types, where the farming intensity is such as to justify it; (b) using somewhat smaller amounts of lime and fertilizer where the more extensive systems of livestock production are practiced, but harvesting the hay at the early-bloom stage, while its palatability and its percentage content of the mineral elements are relatively high; and (c) making regular use of mineral supplements in all cases where there is any doubt as to the adequacy of the supply of the necessary mineral elements.

In the present stage of our knowledge, yield of the marketable portion is the most important criterion in determining the point at which to stop increasing the rate of application of lime and fertilizer on any given soil and for any given crop. The primary business of the food- and feed-growing farmer is to

produce carbohydrates, fats, and proteins for which there is always a ready market, as such, or in the form of livestock. The choice from among the plants which will produce one or more of these three groups of foodstuffs depends upon the soil and climatic conditions as well as the price at which they can be marketed. Having chosen his crops, if high yields are obtained, relatively high quality for those crops is likely also to be the reward.

Since proteins are most readily obtained by growing legumes, it is to be expected that every economic effort will be made by the livestock farmer to increase the acreages of these high-mineral crops. Associated with the protein of legumes is the high calcium, phosphorus, sulfur, magnesium, and trace-element content which is so much desired. But the cost of growing legumes is almost prohibitive on certain types of soil. And these same soil types can often be made to grow quite satisfactory yields of some of the better carbohydrate crops, particularly the grasses. Protein can readily be built into grasses by the use of nitrogen fertilizers, the selling-price of which will probably fall to record lows after the war is over. By harvesting the nitrogen-fertilized hay grasses in their early-bloom stage, high-protein hay of relatively high mineral content can be produced. By grazing them at still earlier stages of their growth, further percentage increases in N and in mineral content can be obtained.

It may be well to point out that the next generation of plant breeders is likely to be more concerned with the production of crops that can utilize soil resources more efficiently and show higher yields of carbohydrates, fats, and proteins per unit of fertility. This is quite in contrast to our present procedure of breeding plants to rob the soil more effectively. The high-yielding plants of the future may not contain as high percentages of the mineral elements as their hardier relatives of today. This would point to the need of giving even more consideration to the supplemental use of minerals in both feed and food.

Generally speaking, it is doubtful whether mineral deficiencies will ever be very widespread if crop yields are maintained at economic levels of production. It does not pay to produce low yields. With every step-up in the yield that results from soil treatments there is likely to be a marked increase in the plant's content of the mineral element or elements required to produce that increase. But there will always be large areas of marginal land and of subnormal soil from which we shall have to accept crops of subnormal mineral content. The remedy in these cases will undoubtedly be found in the supplemental feeding of mineral mixtures. Maybe all of these minerals should first be applied to the soil, but this seems highly doubtful.

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Peace—with Pork Chops

(*From page* 5)

wondrous vistas beyond Tenochtitlan, the capital of the ancient Aztecs.

But what Cortez and Pizarro did to level and deface the gleaming marbles and high culture of the dawn of civilization in America will not be done by our modern American travelers when they restore order in Europe. Our mission there by contrast will be to raise up what greed and error laid low, and if this doesn't provide a challenge to the talent and training of the war-weary adventurers, then what else could?

WITH those Spanish explorers, the gold found in America became the curse of their age. It enormously increased the gulf between rich and poor in Europe and caused prices to rise so fast that millions found starvation easier than living. Now we shall see American gold emerge from Kentucky hills perhaps and proceed on another European mission, in which at the forefront will ride the tractor instead of the tank, manned by capable corn-belt farm lads led by agricultural missionaries galore. But before we start such a "cupboard crusade" to relieve a hungry Europe, our ranks must be ready and trained for such a noble duty.

Unless this is carefully planned well ahead, any such rampant overseas crusade for the stomach's sake will be rudely blistered by blunderers and schemers, or at least misdirected by our own bureaucrats.

At the front of any such campaign must be the excellent foreign service of the Department of Agriculture, whose representatives have gleaned a wealth of vital knowledge about the means and methods, the soils and rotations, the markets, and the appetites of the overseas continents.

Moreover, in the Department of Agriculture we have men of good will plus training, who have produced notable contributions to recent knowledge of soils and men and food and life. Associated with them are state experiment station nutritionists, plant and stock breeders, veterinarians, biologists, and bacteriologists—a veritable army of skill —who will have our own and Europe's mess to straighten out.

Hitherto we have paused on the war front only to check up our immediate resources for training boys to fight or serve the fighters, and our girls to release active men for battle duty. Our treatment of the farm front has been casual at best, patch work at most. Seeing our error in that line some of us cry for a furlough for the farm soldiers, no matter how questionable that may be from the standpoint of draftees versus volunteers, and home service versus foreign, or whether we shall let them return if they want to, or make them come back. True, we have lost some of our best tractor drivers and implement menders and farm managers and cow milkers—some of them forever. But this new and eager crop coming up fresh from the field and furrow stand ready to furnish a few million willing men to run this coming sideshow when peace is signed.

ONLY, it won't be a sideshow. For unless we can feed the starvation spots and balance the rations in the realms of malnutrition, all the glorified speeches of politicians and map-makers will be hamstrung at the start.

Don't let us forget either that here and there we still have domestic food shortages and unbalanced rations to bolster up. It is a well-known fact that many of the physical shortcomings of our recruits were traced to poor meals, or not enough meals. Even in the midst of so-called wartime wage booms,

there are thousands bereft of proper food or the right kind of food, caused in part by poverty of cash and poverty of knowledge, and by homes upset through losing housekeepers to work in war plants.

What direct action have we taken to prepare our farm youth for the terrible task of reconstruction which they alone are best capable of carrying out? How many colleges and how many short courses are there which direct their curriculum toward this end, or even whisper anything beyond current and immediate food demands at so much per pound or bushel? The army's own nutrition research bureau comes the closest to it, with the development of concentrated, high vitamin, easily transported, easily kept foods.

Whatever comes, let's not just "leave it to Hoover." It's our job now to create hundreds of Hoovers, with enough vision and uncanny insight to lay the groundwork for a real European reconstruction via the alimentary canal. He who knows what's good for the alimentary canal is going to bag more converts for lasting peace and democracy than anything that's apt to happen near Suez.

THERE should be established a regular Land Reserve Army. It should bear suitable insignia and its recruits should be as well defined and as well regarded as part of this effort of ours as the marines or the navy or the signal corps or the commissary crews. This Land Reserve Army can have auxiliary women workers too, girls fresh from the capable hands of 4-H leaders, with household experience and home economics training.

By elimination tests the best fitted boys and girls could take short courses in the vital subjects that will be needed when America starts where Hitler left off. Everybody knows what that means —more food well packed and graded than this country ever produced, with emphasis on oils and fats. But it also means active duty in helping the discouraged and weakened farmers abroad to pick up where they left off, revitalize their soils, and breed up their flocks and herds.

This means stopping at once all enlistments or drafts of experienced farm teachers and research men and women, so that we shall have a suitable and competent staff to handle the instruction here. Far too many such persons have already gone into line duty which gives them far less vital opportunity for service than the future must bring.

FINALLY, it would seem that our worries about what to do with so much competing raw materials in South and Central America, so alarming to our farm bloc boys, will be partly answered by the dire situation overseas when peace is reached. For a while anyhow all faces will be turned to European outlets, and it will take the best kind of international Pan-American organization to supply the huge empty cupboards and warehouses across the ocean.

"Yes," says the guy who pays heavy taxes, "and who's going to plank out the mazuma to finance all these grand food-crusading schemes? More high income levies and a load of surtaxes besides, just to be sentimental."

That's probably the answer true enough. Uncle Sam will underwrite the restocking of European land and larder after the war. It might be spent worse, at that. Every nickel used for food is worth a dollar shot away.

Whether we pursue our present warlike career because of self-defense, democracy and its destiny, or on some highfalutin' notion that all men everywhere are entitled to the same square deal—regardless of what way we look beyond the invisible horizon, I'll vouch that a full-course meal on the table is better introduction to permanent peace than a hundred diplomats around the table.

After all, won't it be nice to change the tune a trifle so the chorus sings, "Praise the Lord, and pass the gravy!"

Lady (with newspaper in hand): "It says here that a woman in Omaha has just cremated her third husband."

Old Maid: "Isn't that always the way? Some of us can't even get one, and others have husbands to burn."

Then there's the story about the woman who, when she got on the street car with ten children, was asked by the friendly motorman if they were all her children or if it was a picnic.

"Yes," she snapped, "they're all mine, and it's no picnic."

Little Bobby, at Sunday school, was deeply impressed by the story of how the Lord took a rib from Adam's side and made Eve from it. Later in the day Bobby felt a pain in his side.

"Oh, mother," he gasped, "I think I'm going to have a wife."

An old Negro minister, in a sermon on Hell, pictured it as a region of ice and snow, where the damned froze through eternity.

"Why do you tell your congregation that Hell is a cold place?" asked the visiting Bishop.

"I don't dare tell them people nothing else, Bishop. Why, if I was to say that Hell was warm, some of them old rheumatic niggers would be wanting to start down the first frost."

Johnny had defined a collision as two things coming together at an unexpected time.

"Now, Willie," said teacher, "give me an example of a collision."

"Twins," answered Willie.

"Are you troubled by temptations?"

"Why, no. I rather like them."

"And you mean to tell me that in your section of California you have 365 days of sunshine a year?"

"Exactly so, sir, and that is a mighty conservative estimate, too."

"Just think of it; steak only 20 cents a pound, eggs 15 cents a dozen, chicken 10 cents a pound and milk five cents a quart."

"Where?"

"Oh, nowhere, but just think of it."

"I represent the Mountain Wool Company, ma'am. Would you be interested in some coarse yarns?"

"Gosh, yes, tell me a couple."

Two stenographers were airing their troubles. "I'd like to get a divorce. My husband lives in Ohio and I'm here, and we don't get along."

"Why don't you sue him for incompatibility?" asked the other sympathetically.

"I would if I could catch him at it."

Telephone operator to new girl she is breaking in: "No, honey, you say 'Just a moment, please,' not 'Hang on to your pants, mister.'"

Dora: "That sailor is such a dear! He's going to teach me to play cards so I'll know all about it after we're married."

Daisy: "That's nice. What game is he going to teach you?"

Dora: "I think he calls it 'solitaire.'"

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Circulars

Potash Pays on Grain (South)
Greater Profits from Cotton
Tomatoes (General)
Asparagus (General)
Vine Crops (General)
Sweet Potatoes (General)
Grow More Corn (South)
Fertilizing Small Fruits (Pacific Coast)
Potash Hungry Fruit Trees (Pacific Coast)
Fertilize Potatoes for Quality and Profits (Pacific Coast)
Better Corn (Midwest) and (Northeast)
The Cow and Her Pasture (Northeast) and (Canada)
Fertilize Pastures for Better Livestock (Pacific Coast)
What You Sow This Fall (Canada)
Home-grown Grains for Profitable Hogs (Canada)
What About Clover? (Canada)
Of Course I'm Interested (Pastures, Canada)

Reprints

B-8 Commercial Fertilizers in Grape Growing
K-8 Safeguard Fertility of Orchard Soils
T-8 A Balanced Fertilizer for Bright Tobacco
CC-8 How I Control Black-spot
II-8 Balanced Fertilizers Make Fine Oranges
MM-8 How to Fertilize Cotton in Georgia
A-9 Shallow Soil Orchards Respond to Potash
N-9 Problems of Feeding Cigarleaf Tobacco
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CC-9 Minor Element Fertilization of Horticultural Crops
DD-9 Some Fundamentals of Soil Management
KK-9 Florida Studies Celery Plant-food Needs
MM-9 Fertilizing Tomatoes in Virginia
PP-9 After Peanuts, Cotton Needs Potash
UU-9 Oregon Beets and Celery Need Boron
A-2-40 Balanced Fertilization For Apple Orchards
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
H-3-40 Fertilizing Tobacco for More Profit
J-4-40 Potash Helps Cotton Resist Wilt, Rust, and Drought
Q-5-40 Potash Deficiency in New England
S-5-40 What Is the Matter with Your Soil?
T-6-40 3 in 1 Fertilization for Orchards
AA-8-40 Celery—Boston Style
CC-10-40 Building Better Soils
EE-11-40 Research in Potash Since Liebig
GG-11-40 Raw Materials For the Apple Crop
II-12-40 Podsols and Potash
JJ-12-40 Fertilizer in Relation to Diseases in Roses
A-1-41 Better Pastures in North Alabama
E-2-41 Use Boron and Potash for Better Alfalfa
I-3-41 Soil and Plant-tissue Tests as Aids in Determining Fertilizer Needs
K-4-41 The Nutrition of Muck Crops
L-4-41 The Champlain Valley Improves Its Apples
Q-6-41 Plant's Contents Show Its Nutrient Needs
R-6-41 A Balanced Diet for Nursery Stock
U-8-41 The Effect of Borax on Spinach and Sugar Beets
W-8-41 Cotton and Corn Response to Potash
Y-9-41 Ladino Clover Makes Good Poultry Pasture
Z-9-41 Grassland Farming in New England
BB-11-41 Why Soybeans Should Be Fertilized
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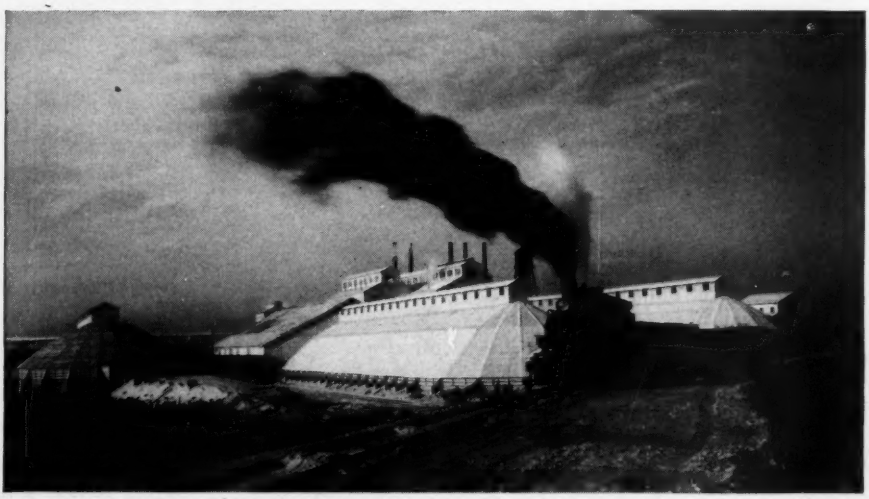

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